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Financial Support of Medical Education*

H. G. WEISKOTTEN
Dean, Syracuse University College of Medicine
Syracuse, New York

Recently programs have been suggested for making available to the medical schools of the country large sums of money in the form of grants for research. These same programs have proposed fellowships for faculty members in an effort to raise the standards of education and stimulate research in all medical schools. Health and medical programs centering in the medical schools are being proposed by both official and non-official agencies. All of these proposed developments have stimulated me to present this paper on the basic financial support of medical education.

I fully realize that I am dealing with only one of several interrelated factors which are essential to the conduct of a satisfactory program of medical education. For example, an adequate physical plant, a competent faculty and satisfactory clinical facilities are just as important as the annual budget. I believe that it is important for the public and all those responsible for the support of medical education, as well as medical educators, to realize that there is an essential basic minimum of support required for the conduct of a satisfactory undergraduate program of medical education.

The phenomenal advances in the prevention, diagnosis and treatment of disease which have occurred in recent years have demanded radical changes in the curriculums of medical schools. These changes have greatly increased the cost of medical education.

With continuing new developments in the field of medicine, the responsibilities of medical schools are constantly increased and the basic support required for meeting these responsibilities becomes ever greater. At the same time, it should be pointed out that adequate funds allotted to the support of medical education are paying increasing dividends in the form of better medical care for the American public. However, without the required basic support, no school offers much promise of a satisfactory development. Furthermore, it is obvious that without such support fellowships for faculty members and grants for research mean little or nothing in the development of a school. For example, to

* Read at the Fifty-seventh Annual Meeting of the Association of American Medical Colleges, held in Edgewater Park, Mississippi, October 28-30, 1946.

offer a member of an inadequately supported, one or two man department, a fellowship for one or two years of study in a well supported medical educational and research center, offers little promise for the development of the school.

In the first place, it will be difficult or impossible to find a competent man who is willing to work under the adverse conditions existing in the school during the period when the faculty member is on his fellowship. In the second place, if the faculty member has profited as he should from his fellowship, he will be loath to return to his inadequately supported department. Furthermore, if he does return, it is unlikely that he will have the time, facilities or support for the development of a satisfactory program of teaching and research. Under such circumstances, the mere grant of funds for research offers little promise.

I do not wish to minimize in any way the value of fellowship grants to promising young men in the field of medicine. They mean much in providing competent and adequate personnel for the practice of medicine and for the overall conduct of teaching and research, as well as for the expansion of well supported research programs. However, I do wish to point out that they mean little to the development of a basically inadequately supported school.

What comprises basically adequate support will have different meanings in different institutions. Much may depend on the size and location of the school, its integration into the financial structure of a parent institution and other factors. Frequently, such items as general administrative costs, upkeep of buildings and grounds and support of library are carried by the parent institution and do not appear in the budget of the medical school. On the other hand, some schools find it necessary not alone to carry such items in their budget but also to expend considerable sums for the maintenance of clinical facilities.

Although the number of students in a class is a definite factor in determining what will be adequate financial support for a school, a basic minimum of personnel is required for the satisfactory functioning of any department of a school regardless of how small the classes may be. Such personnel would usually be sufficient for classes up to, approximately, fifty. Larger classes would require additional competent teachers as well as additional facilities.

The basic minimum of personnel required for the satisfactory conduct of a department naturally differs somewhat in the various departments. Experience seems to indicate that with a departmental staff of less than three, no basic science department can be expected to carry on a satisfactory teaching and research program. In addition, there must be available secretarial and technical assistance as well as adequate funds for equipment and supplies. The department of anatomy, responsible for the teaching of gross and microscopic anatomy as well as embryology and neuroanatomy, requires as a basic minimum an even larger staff.

If reasonable and attractive salaries are paid, the basic minimum budget of each of the basic science departments must be from $20,000 to $25,000. Thus, the minimum budgets for the departments of anatomy, biochemistry, physiology, pharmacology, pathology and bacteriology would total from $125,000 to $150,000. This estimate is for basic science departments whose sole teaching responsibility

is for medical students. If these departments are also responsible for teaching students from other schools of the university proportionately larger budgets would be required.

An estimate of an essential basic minimum of support required for the satisfactory conduct of the clinical departments is complicated and depends on many variables. The location of the school, the availability of satisfactory clinical facilities, the availability of competently trained men in the various clinical specialties interested in teaching, as well as the heritage of the school, all have an important bearing on the cost of the conduct of the clinical departments.

Under any circumstances, modern medical education requires that all of the major clinical departments have a certain number of well trained men serving the school on an academic basis. Such faculty members will require facilities and assistance for at least moderate research programs. Such opportunities for research are essential not alone to meet the demands of interested faculty members, but also for the conduct of a satisfactory educational program. The essential basic minimum of support required for the various clinical departments will naturally vary, with the departments of medicine and surgery requiring the largest budgets. The minimum total budget for the departments of medicine, surgery, pediatrics, obstetrics and gynecology, public health and psychiatry will vary from $125,000 to $150,000. This estimate in no way involves the elimination of volunteer and part-time clinical teachers. This group of teachers always have and I hope always will make an outstanding contribution to the teaching programs of our medical schools regardless of the magnitude of their budgets. Neither does this estimate include any hospital costs or expenditures for the support of any clinical facilities required for a satisfactory teaching program.

This gives a total minimum instructional budget of from $250,000 to $300,000 for the conduct of a satisfactory program of undergraduate medical education for a small school. To this should be added at least $15,000 to $25,000 for the support of a satisfactory library.

The cost of administration will vary greatly depending on how thoroughly the administration of the school is integrated into that of a parent institution. Under any circumstances a budget of at least between $20,000 and $30,000 should be available for the administration of the medical school itself.

If the maintenance and operation of the physical plant, together with animal quarters, is charged to the medical school, an additional item of from $30,000 to $50,000 must be included in the budget. This gives a minimum total budget of from $315,000 to $405,000.

In presenting these figures as the basic minimum requirements for the conduct of a satisfactory program of undergraduate medical education, I fully realize that many will disagree with them. A few will argue that they are unwarrantedly high. More will argue that they are far too low. I am presenting them as my estimate of a required minimum which will allow a school to offer a satisfactory program of medical education and at the same time serve as a foundation on which a school may develop and expand.

Having acquired this basic support a school should be expected to justify and attract such additional funds as are required for its further development.

The responsibility for the future health and medical care of the American public rests largely on the medical schools of the country. It is time that the American public realized that approximately one-half of the medical schools are operating on budgets far below the essential basic minimum required for the conduct of a satisfactory educational program. A number of schools, although meeting this essential basic minimum required for a small school, are entirely inadequately supported in terms of the large size of their student bodies.

This state of affairs should in no way be interpreted as a criticism of the deans or faculties of these inadequately supported schools. On the other hand, great credit is due those responsible for the conduct of these schools for what they have been able to accomplish in the face of entirely inadequate financial support. It is the responsibility of the medical educators of the country to tell the public frankly that medical schools cannot possibly meet their responsibilities in the training of physicians unless they are provided with the essential basic minimum of support. Funds for the satisfactory support of the medical schools will pay enormous dividends in the health and medical care of the American public. Many health and medical care programs being proposed today apparently are based on the assumption that medical schools are supported adequately and are in a position to make large contributions to the furtherance of these programs. Nothing could be farther from the truth.

Thus, it is especially timely to point out that the first and most important step to be taken in improving the health and medical care of the American public is to see to it that medical schools are provided with sufficient funds to conduct a basically satisfactory program of medical education.

Support of Medical Education By Student Fees*

VICTOR JOHNSON, Ph.D., M.D.
Secretary, Council on Medical Education and Hospitals,
American Medical Association
Chicago, Illinois

A consideration of the role of student fees as a source of financial support for medical education in this country reveals more than is gratifying in the development and present state of medical education in its broader aspects. At the turn of this century, for example, the standards of medical education were decidedly inferior. Admission requirements were rather generally either nonexistent or disregarded. An applicant's ability to read and write was less important than his ability to pay. The medical school program itself was decidedly inferior. Facilities were poor, teachers unqualified and too few, and instruction haphazard.

One of the main reasons for this sad state of medical education related to student fees. In those days tuition more than met the costs of medical education and the operation of medical schools was a profitable business. Almost anyone could open a medical school and almost everyone did.

The rash of new medical schools which broke out in this country during the late 1800's is appearing again today, when again, nearly everyone wants to start a new medical school. True, the motives are different. In those years, profit from tuition was sought, and the end was achieved. Today, the new schools desire to provide general practitioners for the rural communities; a more worthy goal, but unfortunately less likely to be reached.

In 1905, when the Council on Medical Education and Hospitals of the American Medical Association was established, there were one hundred and sixty medical schools in this country. The necessity was recognized for a vast improvement in medical education and its establishment on a sound financial basis in which student fees were recognized as not only an illegitimate source of profit to the faculty and administration of a medical school, but also as inadequate to meet the costs of medical education disregarding actual profits. The Council therefore commenced to survey the medical schools of this country. A great deal of difficulty was encountered; there was considerable resentment by some medical schools. Consequently assistance was sought from the Carnegie Foundation in a survey of medical schools and a public report on their condition with suggestions for improvement. This report, commonly known as the "Flexner Report," carried a great deal of weight with the medical schools, the profession and the public. A result of this publication was the amalgamation and elimination of approximately one-half of the medical schools in this country. The schools which were closed consisted mainly of institutions depending primarily on tuition

* Read at the Fifty-seventh Annual Meeting of the Association of American Medical Colleges, held in Edgewater Park, Mississippi, October 28-30, 1946.

for financial support or, not much worse, even profiting from tuition income.

Because of the closure of many schools, there was much fear expressed lest there might be a marked diminution in the number of graduates and a deficiency of doctors. The earliest consequences of the survey seemed to bear out these fears. In 1922 there were about half as many graduates from about eighty schools as there had been in 1905 from twice as many medical schools.

However, the ensuing two decades to the beginning of the recent war saw the remaining medical schools gradually but definitely strengthened by increased facilities, faculty members and financial support. This support came from endowments, gifts and tax sources. With the strengthening of the remaining medical schools there was a steady increase in the number of graduates so that before the war there were about as many graduates from the fewer schools as there had been forty years earlier from one hundred and sixty schools. These graduates moreover had a training far superior to that of the earlier years, because of the general recognition that a satisfactory school cannot be operated on student fees alone.

Unfortunately, it is not yet universally recognized that medical schools cannot operate primarily on student fees. A recent study[1] revealed that ten of our approved medical schools contribute less than fifty cents from nonstudent sources for every dollar paid in tuition by students. There were fifteen additional schools providing less than dollar for dollar; the remainder matched each student dollar with one or more dollars derived from endowment gift or tax sources. There were only eighteen schools able to provide two or more dollars for each student dollar. The average for the country was less than two school dollars for each tuition dollar. Medical school budgets in which the schools provide less additional money for the educational program than is forthcoming from student fees—and there are 25 schools in this category—are well below the minimum figure suggested by Weiskotten.[2]

Criticism of the administrative officers of poorly-supported medical schools is not intended. Everyone is aware of the tremendous difficulties entailed in obtaining adequate funds for the operation of a satisfactory medical school. Rather, criticism is directed at states and institutions whose meager financial support of medical education is not too far removed from the days when medical schools were financially profitable to the proprietors.

Among the many difficulties encountered in medical education during the war and afterward were those imposed by developments concerning tuition. Several factors contributed to increasing considerably the wartime income from student fees in a good many medical schools. These were the accelerated programs resulting in tuition being paid for the entire calendar year, the increased enrollments of all medical schools which also increased tuition income, and the

1. Willard Rappleye. (Unpublished data.)
2. H. G. Weiskotten. Journal Assn. Amer. Med. Colls. 22:1 (Jan.), 1947.

payment of out-of-state tuition fees at state schools in the AST and Navy V-12 programs. The increased revenues resulting from these factors were reflected in increased wartime medical school budgets. Now, with acceleration and increased enrollments gone, some medical schools face alarming budget reductions. Elsewhere, medical school budgets are being temporarily maintained because general university tuition income is at an all-time high, from generous fees paid for unprecedented thousands of non-medical students enrolled under the "G. I. Bill of Rights." But this influx of student gold will not continue long. Acceleration and increased enrollments are already gone in medical schools and the G. I. peak will soon be passed in our universities. When that time comes one of two alternatives is certain to occur: the quality of medical education—and therefore of medical care—will deteriorate, or compensating funds must come from non-student sources.

The inadequate financial support provided too many of our medical schools is rapidly creating a serious crisis in medical education, because the salaries and facilities which can be offered faculty members are not sufficient to compete with non-educational institutions or the practice of medicine in attracting outstanding or even competent young men and women. During the war the failure to defer students preparing for academic and scientific instruction aggravated this problem. Now that the war is over all too few people are seeking careers in teaching fields especially in medicine where other outlets for the employment of medical knowledge and skills are so abundant.

It is necessary to emphasize repeatedly to those responsible for providing financial support for medical education that increased costs in the face of diminishing student revenue must mean increased provisions from tax or other sources. Tax sources of funds will probably become increasingly important in the support of medical education. The various states may find it necessary to subsidize a considerable number of non-state institutions. This is now the case in Pennsylvania, where grants are made to the private medical schools. State aid for a non-state school is being sought in Kentucky. In some instances it may be necessary for federal funds to be made available. In assessing the various proposals for federal aid to research and to students in medicine and other scientific fields, serious consideration should also be given to the allocation of funds for the educational programs of medical schools, when the required sums are not available from local sources. Any such program is fraught with the dangers of undesirable interference with the operation of the school. We have just come through a period of such meddling in education by Washington, although most would agree that this was not too serious in the conduct of our wartime program at the medical school level.

Tuition is of concern not only to the institution receiving it, but to the student who pays it. In the first two decades of this century, when poor, unsatis-

factory medical schools were being eliminated and the costs of acceptable medical education were mounting, fears were expressed lest medical education become so expensive that only the sons and daughters of the well-to-do would be able to become medical students. In general it is now agreed that the evidence has probably not borne out these fears to an appreciable degree. Large numbers of medical students have been assisted by scholarships and loan funds. In addition many have earned a considerable portion of their medical school expenses from outside work although this is becoming increasingly difficult with the multiple demands upon student time and energy in the medical school curriculum of today. It is generally recognized that more scholarship and loan funds for needy and competent students are highly desirable. Perhaps some of these also should be forthcoming from federal sources, as is contemplated under certain of the bills which will be considered by Congress. These measures have had rather general support from medical educators and medical scientists.

It was hoped by many that the wartime experiences might provide us with more accurate information concerning the numbers of men and women who are prevented for financial reasons from attending medical schools in normal times, since the ability to pay had nothing to do with the selection of students and the study of medicine under the military programs. Thus far no objective information is available to us on this question although there is the impression that many were able to obtain a medical education under these programs who would otherwise have been unable to do so.

For a time we will continue to have large numbers of medical and premedical students who are relatively well-supported financially under the educational provisions of the "G. I. Bill of Rights"; they have no tuition worries. It has been gratifying to many to observe the quality of work done by students whose tuition is provided under the veterans bill. Repeatedly it has been found that students in premedical studies before the war who were doing decidedly inferior work are now performing at a greatly improved level. Perhaps the apparent improvement is an illusion created by leniency in grading. Some think this is the primary factor in operation. Yet it is difficult to disregard the opinions of many competent teachers in direct contact with these students, who are impressed with the superior quality of their work. The early gratification of those responsible for the G. I. educational programs in England and France after V-E Day has been frequently repeated in the past year. The final judgment as to the quality of academic performance remains to be made. Yet there are sufficient indications of an improved quality of work so that we are compelled to attempt to seek provisional explanations even now. Presumably the intelligence of student veterans was not changed during the war. Improved motivation may be a major factor. There seems to be a greater earnestness and industry on the part of veterans than is displayed by others or even by these students themselves prior to their war experiences. Perhaps an important factor in this improved performance is the fact that the veterans need concern themselves relatively little

with financial matters. Their tuition is paid and subsistence allowance enables them to concentrate on their studies without particular concern for their financial support. True, this support was also given the A. S. T. and Navy V-12 students, but there were so many variables operating at that time that the effects of the financial aid were difficult to determine.

It is reasonable to expect that students living a more normal adult life, with wives and children, may be expected to do better work. The greater emotional stability for this reason, and because the students are more mature, may well be important in improving student performance, and should be assessed carefully by those who are concerned with the long period of training necessary in medicine, which in the past has prevented many from living emotionally normal lives in the early adult years. Perhaps our experiences with the veterans will justify the belief of some that extensive support for tuition purposes is necessary after the expiration of the present assistance by the government for the education of veterans.

Whether or not this comes to pass it must be recognized by all that fees paid to medical schools by students whether they are derived from loan, scholarship or tax sources cannot support an adequate program of medical education. These fees must be supplemented by large sums derived from elsewhere so that as a minimum standard no medical school in this country will fail to provide the essential basic budget suggested by Weiskotten; otherwise the quality of medical education and medical care will surely deteriorate in this country.

Research and Medical Education*

CHARLES A. DOAN
Dean and Director of Medical Research, College of Medicine
Ohio State University
Columbus, Ohio

"Our civilization is a race between education and catastrophe," predicted H. G. Wells after World War I. The Princeton University Faculty and Board of Trustees in their year of bicentennial celebration beginning this fall, following an inventory of current educational accomplishment, state: "The grave crisis in human affairs, which confronts us today, transcends all national bounds and imposes new and pressing obligations upon the world of learning. Wise men must speedily take earnest counsel lest the world's tragic sacrifice shall have been offered in vain."

The present foreshadows, the future holds, events of critical significance for medical progress and education. There will be need for courage and vision to face clearly the basic issues confronting our art and science today. Planning must be wise, accomplishment effective.

The first need in America today is a new generation of trained men and women, who can do those things which have never before been done,—leaders in thought and deed, not routine followers of tradition,—men and women who are intellectually capable, morally responsible, emotionally and spiritually mature, socially competent, and last but not least, physically fit. Where are we to look for these well rounded citizens of the world except from our Universities, where there remains, if anywhere, the essential opportunity to gain acquaintance with the best that men have said, and done, and dreamed,—and are now, in the process of saying, and doing, and dreaming? This first essential is a self evident fact for which no marshalling of evidence should be required, here, today. And yet, there are those in responsible positions, who behave at least, as though this were not the case. Last February in "Time," the President of Detroit's Economic Club was quoted as stating: "Almost all of the 200-odd business and professional leaders I have questioned consider higher education in the United States a waste of time and money." This is but an echo of Walter Lippman at the beginning of World War II (1940): "There is an enormous vacuum, where until a few decades ago there was the substance of education." Perhaps these gloomy appraisals are intended to convey a subtle innuendo of warning to educational leaders that: "Education *is* an admirable thing, but it is well to remember from time to time that nothing that is worth knowing can be taught." (Oscar Wilde.)

Those intelligently and sincerely interested in passing on the torch of medical knowledge have, for the most part, exemplified this philosophy of self-experience in education through the years, providing personal opportunities for, and sharing experiences with, younger apprenticed associates according to the ancient

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Hippocratic admonition. Today, however, even more than at any time in the World's history, we need to be reminded again of our obligation, not only to train competent clinicians, but to provide scientifically minded, medical investigators and teachers of superior ability and idealism. Through no fault of any single factor or circumstance, but as the result of the world situation in which we find ourselves, we are at the moment just emerging from a period of almost complete sterility insofar as the training of young medical investigators is concerned. This reflects, and is reflected by, the obvious fact that the time and thought of the present generation of investigators has been unavoidably diverted and largely directed into channels of practical necessity demanded by the emergency war effort. Witness the programs at recent national medical gatherings! Where progress has been accelerated in certain directions with a net profit to the peacetime problems of humanity, it has been all but stopped completely in other challenging areas. New problems have multiplied faster than the old ones could be solved. The opportunity to follow one's imagination ad libitum, out of which have emerged so many of the beneficent ideas and advancements, tangible and intangible, in the realm of the human intellect, has been nil for a decade in this country, and for an appreciably longer period elsewhere in the world. "It is impossible (as yet) to evaluate the effects of the program for the acceleration of premedical and medical education, because it was carried out during a period in which it was impossible to control those other factors which are involved in medical teaching. However, if previous concepts in medical education were correct, the decrease in the time spent in premedical preparation and the lack of opportunity for individual research or contemplation, which marked this program in medical schools, were undesirable features."[1]

The Borden Foundation, Inc., established during 1945 Undergraduate Research Awards in 23 medical schools in this country. In a letter dated October 8, 1946, Mr. W. A. Wentworth, Secretary of the Foundation, tells me that only seven of these colleges have as yet made awards, though all have had at least one, and some have had two commencements in the meantime. The number of undergraduate research candidates qualifying for consideration for this award in any one class has ranged from 2 to 19 in these seven schools. My obeisance to the two medical schools in this country, which reported 10 and 19 student investigators, respectively, in senior classes completing their degree work at the end of World War II. "Some of them (deans of colleges where these awards have been established) have expressed the opinion that perhaps undergraduate research has been a matter of too small concern in past years. . . . Generally stating, we were encouraged and heartened by the responses of deans to whom the offer was made to establish undergraduate research awards. We believe that these men, who are in such intimate contact with problems of medical education, constitute the best authority in gauging the value of a program such as has now been established, and we feel privileged to participate in this apparently grow-

1. Long, Perrin: "Medical Progress and Medical Education During the War," read before the Council on Medical Education and Hospitals of the American Medical Association February 11-12, 1946, p. 12.

ing emphasis on the value of research in medical education." (Personal communication.)

My thesis today is the dilemma we face in our undergraduate program of recruitment for medical investigators, but Dean Stanley Dorst, from a neighboring campus, in decrying the present inadequacy of the premedical preparation of our students, said a little earlier this year: "We are trying to educate both the scientist and the physician—a very small number of men and women, who will be true scientists in medicine, and are the pride of their schools; and a very much larger group who will be physicians, practicing the art of healing mind and body, but using the skills which science has devised. It is the education of this second and larger group, which suffers deplorably under our present system of premedical education."[2]

I received under date of Sept. 19, 1946, a personal letter from one of our recent graduates, who had participated in independent research as an undergraduate medical student and who has since, both in the Army and now again in an academic atmosphere, continued his fundamental investigations. He writes: "My chief objection to 'premed' work is mostly beyond your control,—the ivory tower instruction methods in the courses themselves. This was brought out particularly sharply by the army intensive courses, which taught men in 6 weeks a better command of a modern language than was given in 3 years of the old 'grammar first and last.' I feel cheated when I realize that I had two years of calculus and yet am soon lost in trying to work out simple statistical problems. I had two years of College German and yet feel like decoding a cipher when I attempt to read scientific German with the aid of a dictionary. . . . It may be that you and your colleagues at the helm of American medical schools could combat this to some extent by minimizing the stated amount of fixed time requirements in science, and putting them on a practical basis; not so many years of certain subjects, but an ability to read and understand a foreign language or to formulate organic reactions of real significance. The schools have been too afraid to discontinue 'hours and years of this or that,' which lets the man arranging the undergraduate course do our thinking for us in deciding what he shall include and with what emphasis. . . . Each candidate should be hand-picked and by medical school faculty men. There, by golly, you have it!"

It would seem that neither those responsible for the educational preparation of our youth for the future, the more thoughtful students themselves, nor the critical sideline observers, are satisfied with current academic performance in any sphere. This is the healthiest sign on the educational horizon today.

I was talking last week with the conscientious editor of one of our best medical journals in which appear each month significant original contributions to clinical medicine: "While I am receiving slightly more manuscripts this year than last," he commented, "my editorial board is rejecting or returning for further critical work between 70 and 80 per cent of all papers submitted. This is a larger proportion than last year, and an all time high for us. We are desper-

2. Dorst, Stanley: The Premedical Program.. The Scalpel, 16 (August), 1946.

ately in need of material of quality." During the past three months I, personally, have received more direct solicitations from the editors of both new and established medical publications urging submission of manuscripts than in all of my previous 25 years of active medical investigation combined. This in itself is an invitation to premature and unjustified publication, and a temptation to prolific, uncritical hypothesizing, and it only serves to emphasize the dangerously low ebb of current, scientific, medical productivity of superior quality.

Chas. F. Kettering of the General Motors Research Division is quoted in "The Chemical Digest" for October, 1946: "If out of 100 ideas we get one or two that work we are content. I've always felt sorry for the kid who fails in grammar school. He flunks one exam. and is out. A research man, on the other hand, flunks 999 times, but if he succeeds once he's in. Research is the only way out (of a rut), as far as I know. . . . (Defined), Research is a process of finding out what you are going to do when you can't keep on doing what you are doing now. The opportunities in this world are as great as we have imagination to see them. But, you never get the view from the bottom of a rut." Alexander Hamilton expressed the same idea somewhat differently: "Men give me credit for some genius. All the genius I have lies in this: When I have a subject in hand I study it profoundly. Day and night it is before me. I explore it in all its bearings. My mind becomes pervaded with it. Then the effort which I have made is what people are pleased to call the fruit of genius. It is the fruit of labor and thought." Milo of Crotona learned to pick up a full sized bull by beginning with the bull when it was a calf. An individual's mental muscles are developed by graduated exercises with increasingly weighty intellectual tasks. Thomas Huxley in his essay on "A Liberal Education" used still another simile: "The rung of a ladder was never meant to rest upon, but only to hold a man's foot long enough to enable him to put the other somewhat higher."

"Dr. Elliot Clark has in his possession a diagram which Franklin Paine Mall once traced, indicating that from 10,000 students there might be selected 1,000, and from them a group of 5 might start in research. Of this group he said that all might make specimens but only one might really study them,—and that perhaps even he might not come to any biological conclusions, that is, develop into an investigator."[3]

If these arbitrary estimates are even figuratively correct,—only one student in 10,000 capable of becoming an investigator, and one idea only in 100 proving tenable, with 999 attempts out of every 1,000 failures,—perhaps we may have a better appreciation of the reason for the current dilemma faced by our editorial boards, and the field of medical science in general.

It is, therefore, most essential to have a large number of new "prospectors" take up claims now, along this stream of potential factual wealth. There are tiny grains of true gold-dust to be painfully and slowly panned, and to be carefully differentiated from "fool's gold." When added together, over a period of time, a "pouch" of considerable value results, and the labor will not go unrewarded,

3. Sabin, F. R., Franklin Paine Mall: The Story of a Mind, Johns Hopkins Press, 1934.

if faithfully performed. The lure of finding a rare "nugget" sometime, makes the search an exciting, ever new adventure each day. Over the years, the sum total of the wealth of accumulated knowledge assumes the importance, rather than the human agents responsible for specific achievements—be they great or small. We know where the "pay dirt" lies today. Attract, and equip, and furnish with the "map" of the regions to be explored, a new generation of young, eager, and enthusiastic prospectors! The future returns on such a human investment are incalculable today, but are as certain as tomorrow!

At best, the return to fundamental basic, and sound clinical, investigation will be necessarily slow. The "right frame of mind," contributing to and participating in a stimulating scientific atmosphere,—yet to be recreated in many centers,—in which the cross fertilization of ideas may occur freely, is more essential than physical facilities. Re-establishment of the former conditioned reflexes of a scholarly approach to nature's unsolved problems can come only with time and conscious effort. This must occur in our investigator-teachers before it may be expected with any degree of assurance in our students. Albert Casey, in a statistical analysis of certain data for the years 1932 to 1934, concludes that "the high inverse correlation between the research activity of the faculty and the failures of their students on state board examinations, should be brought to the attention of faculties and administrators."[4] Ordway Tead in writing of "The Meaning of Scholarship for Today," admonishes us that: "Scholarship may grow out of research, may be built on research, but it is of another essence. It has to do with placing the value of the research and the meaning and significance of the findings. Scholarship includes the capacity to be wisely evaluative as one of its most vital attributes. In any sense adequate for today's distress, your scholar is thus a philosopher. He is concerned to establish, to clarify, to secure appreciation for some special body of knowledge, because it helps to a better grasp of the whole of man's world. The problem of unity in diversity, of the one and the many, is every scholar's problem. In a world and in an age so surfeited with facts as is ours, to relate the particular to the general becomes essential. If the scholar seems to have forgotten how to view matters under the aegis of eternity, that boon, too, has to be restored to him."[5] The medical scholar in short, must be both priest and philosopher, patient guide and discerning friend to humanity.

"Universities," soliloquizes Walter B. Cannon in his autobiography, "The Way of an Investigator," "offer the opportunity of combining the two functions of teaching and investigation. In these centers the productive scholar is highly appreciated, both for his discoveries and for the worthy example he sets before young persons in his persistent devotion to the increase of knowledge. Teachers who are investigators filled with an ardor for discovery and acquainted with ways to nature's hidden secrets, arouse in young men the qualities they themselves possess. In the companionship of such teachers, students catch glimpses

4. Casey, Albert E.: Research Activity and Quality of Teaching in Medical Schools, *Science*, 96: 110 (July 31), 1942.

5. Bull. Ass. Am. M. Colls., 32: 220, 1946.

of a possible approach to regions still unmapped and are stimulated to become likewise eager in the desire for exploration. That is the theory of the presence of investigators in universities; thereon is based the trust in their influence over the youth whom they instruct. The richness of university life flows from such noble memories. . . . Young persons who undertake original studies along with their regular medical work are not likely to be satisfied with an appeal to authority; they have had insight into the conditions of discovery, and have established a basis for understanding the progress of science and the inevitable changes it involves."[6]

Mall in an address delivered at Ann Arbor in 1904 on the "Value of Research in the Medical School" spoke these words: "It may be mentioned that a bit of original research on the part of the student is by all odds of the greatest educational value to him. It gives him a standard by which he weighs all things later in life, and enables him with much more certainty to separate the real from the bogus in our superabundant medical literature."[7]

Cannon has this to say of his own early interest in research: "At Harvard College during the nineties . . . two of the twenty-two courses I completed were of research quality. . . . My student years were for me exciting. New ideas were constantly flowering, because of contact with stimulating teachers and access to stimulating books and, also, because of companionship with intellectually eager fellow students. . . . With Dr. Davenport I completed my first investigation of a biological phenomenon, the orientation of minute swimming organisms to a source of light. Thus, I caught a glimpse of the attraction of scientific research. . . . When I was a boy my father had expressed a wish that I might become a doctor. . . . At that time I was attracted by the possibility of devoting my life to neurology and psychiatry. . . . It is probable that if, while a first year student of medicine I had not undertaken research on the physiology of the digestive tract by use of the, then, newly discovered x-rays, I would have become a neurologist. . . . My father's wish that I might become a physician was, therefore, never realized. Instead of engaging in practice I engaged in teaching medical students. . . . This mode of spreading one's influence is one of the incidental satisfactions that the investigator can enjoy. . . . To look away and see disciples pushing onward in new directions and in turn initiating their young collaborators into scholarly careers is indeed a rich reward."

The experience of Dr. Cannon may be duplicated almost endlessly with the stories of the great and the near-great in the field of scientific endeavor. Sabin, in her Life of Mall, traces the inductive method in biological teaching back to the German zoologist, Döllinger, and his pupil von Baer, the embryologist. In 1812, von Baer, who had been studying medicine for two years at Dorpat, enlisted as a student-physician in Napoleon's army in its march on Moscow. After surviving the typhus epidemic and the discouraging responsibility of a ward of 150 patients, he became profoundly dispirited with the unscientific

6. Cannon, W. B.: The Way of an Investigator. W. W. Norton & Co., N. Y. C. 1945, pp. 79 and 82.
7. Mall, F. P.: The Value of Research in the Medical School, Mich. Alumnus, 8: 395, 1904.

medical empiricism of the day. He began searching for a source of more intellectually satisfying fundamentals, and was eventually directed to Döllinger for the study of comparative anatomy. Upon arriving at Würzburg he found to his great chagrin that it was the wrong semester for the "lectures" he had been anticipating. Döllinger, sensing his deep disappointment, said: "Why lectures; why not bring to me any animal form you wish, and then another, and another, and dissect them here?" Not knowing any of the fauna of the neighborhood, von Baer went to an apothecary and bought a leech. Döllinger showed him how to start, and then left the young curiosity-saturated neophyte to his slow and clumsy dissection for a period, before bringing to his attention the high standards of workmanship which already existed in the Monograph of Spix. So the work went on, with informal instruction and exchange of experience, with the teacher always directing the pupil to the existing monographs on each subject at the right moment, then sharing his own more mature critical judgment. It was Döllinger who suggested to von Baer the study of the development of the chick, the results of which laid the foundation for modern embryology. Döllinger taught and trained similarly Purkinje, Pander, Martius and Aggasiz, and lived to see von Baer introduce into the dissecting room at Königsberg, the same system, which provided an opportunity for his students to dissect for themselves under careful guidance,—a pattern of "elbow-teaching" transmitted by direct extension to this country through Mall at Johns Hopkins. Llewelys Barker, writing of Mall, whose first assistant he was for a number of years, says: "He was a master of what is called "elbow-teaching," and no student who has ever been at his elbow will ever forget the character of this relationship,—his trenchant comments, his startlings of the intellect and emotions, his humorous and sometimes satirical thrusts, and above all his earnest and sincere desire to make the neophyte an independent worker."[8]

Henry E. Sigerist in his preface to "The University at the Crossroads" testifies: "I have heard of streamlined methods of education, but I, personally, have no method, or only a very primitive one, that consists of thinking aloud and having students participate in my own research work."[9]

Augustus Waller was a first year student at the University of Paris when he began the special studies which led to his proving that nerve fibers are parts of nerve cells, undergoing "Wallerian" degeneration when they are separated from the cell nucleus. Hermann von Helmholtz had published a paper on yeast fermentation before receiving his medical degree. As an undergraduate Paul Ehrlich devised his essential straining methods for the differentiation of the various types of white blood cells. And Paul Langerhans began his study of the pancreas while still a student. Niels Stenson, a Danish student, while dissecting the head of a sheep at Amsterdam (1661) accidentally caught his probe in the duct leading to the parotid gland. Adolph Wendt, while a pupil of Johannes Purkinje, discovered the sweat glands of the human skin (1833).[10] The value of blood plasma

8. Sabin, F. R.: Mall, Anatomist, The Johns Hopkins Press, 1934, p. 139.
9. Sigerist, H. E.: Henry Schuman, New York, 1946.
10. Harris, D. F.: Eminent Undergraduate Observers. Med. Life, 32, 3, 1925.

as an emergency treatment for severe hemorrhage was first demonstrated by two medical students in the Harvard Laboratory of Physiology.[11] Bruce Mccallum, while a student at Johns Hopkins, unravelled the hitherto unrevealed complexities of the heart musculature; and the circulation of marrow and the origin and maturational development of avian and mammalian blood cells, were first demonstrated by a medical student during his first two years in the same laboratory.[12]

The main trunks of the fruit-bearing trees in the world's scientific orchard have been bruised and bled mercilessly and recklessly during the two World Wars in our lifetime, even as have been prodigally consumed most of the natural resources upon which mankind is dependent. Pruning with discrimination to strengthen the main stem, followed by extensive grafting of entirely new selected stock,—which will require careful "nurturing and spraying,"—must precede any hope of future harvest-seasons with a bounteous crop of perfect fruit,—not insect-scarred, worm-infested "seconds" and nubbins. To the medical colleges of this day in this country, and therefore to you, gentlemen, here, has fallen, not by choice but by circumstance, an immediate, tremendous task of world encircling scope. Not only must we recruit productive replacements for our own faculties for self preservation, which represents the only guarantee of survival for the "goose which lays the golden eggs" in medical science today, but we are responsible for a continuous supply of prepared and trained minds—the scientific leadership—for an increasingly urgent demand from International, Federal, and State research groups, from privately endowed, non-teaching, Research Institutions, and from many Commercial Laboratories, whose financial and technical inducements to well-trained teacher-investigators, place the Universities at a great practical disadvantage. Human nature being as it is, we cannot expect the high idealism, which usually accompanies the initial awakenings of a maturing mind in biological science, to always choose to follow even a strong inner desire for a teaching relationship with an eager student group, when both laboratory opportunities and personal remuneration are placed in the opposite side of the balances. I know personally, first-hand, many scientific investigators today in non-teaching positions, who have admitted to me that they should be doing their research in our medical schools, where, at the same time they could be recruiting their own assistants instead of bidding for them in the open market,—or on the black market, the shortage of personnel being what it is today,—and many are now having the courage of this conviction! Not that these extra-university opportunities are not the legitimate result of the evolution of our modern social development, from which contributions to the welfare of humanity are being made on a scale which our "pilot plants" in the universities cannot and should not aspire to parallel or duplicate; but it is time to sound a warning that we are in danger of out-running the supply of human brains; and the ultimate source of all raw human material, the colleges and universities, must be

11. Cannon: Way of an Investigator, p. 82.

12. Doan, C. A.: The Circulation of Bone Marrow. Carnegie Inst., Washington, D. C. Contrib. to Embryology, 1922, 19, No. 67, 27. Exp. Studies on Orig. & Mat. of Avian & Mam. RBC Carn. Inst. Emb. 1925, 83, 163.

permitted to retain at least sufficient selected breeding stock for the reproduction of a healthy, vigorous race of investigators, or they will become as extinct as the dinosaurs. New ability in research does not regenerate from the top productive research laboratories; so-called expert technicians are the only product from this source. It emerges from below, out of an unselected student backlog, as vision and opportunity are presented by inspired teacher-investigators at that level.

There has been expressed from time to time some difference of opinion among medical educators as to the time and circumstance under which research should be shared with the on-coming generation. At the one extreme have been those advocating a compulsory, original thesis from every potential physician before he receives his degree to practice medicine; at the other are those,—usually surgeons or those in the surgical specialties,— who deny any original individual expression or suggestion until the chief-residency, usually the fifth post-graduate year of apprenticeship. I cannot but wonder whether this is not largely the inheritance of prejudices derived from past personal experiences. Whenever any successful individual, reviewing his own relatively satisfactory survival in the competition of his day, begins to generalize, as he almost inevitably does, and thereupon undertakes to lay down a pattern by which all others in an entirely new and different generation may hope to achieve a similar enviable state, he is apt to get into an unscientific argument with another successful peer, who has arrived at his degree of eminence by an entirely different route. New emphases and revised patterns may be necessary with a new emerging social and intellectual maturity. "Medical schools which discourage research,—and there are several such,—and which instruct the students so systematically and didactically that they cannot conceive of even hearing of any additional information, generally produce graduates, who are as sterile of new ideas as a mule."[13]

In polling my own faculty on this question during recent weeks, there has been revealed a range and variety of opinion, which probably will reflect a fair cross section of viewpoints as they exist today in most medical schools. Permit me to quote:

From the Dean of the Graduate School, himself a medical bacteriologist: "I have always had great sympathy for the medical student in reference to his crowded program of study. Therefore, if he does research in addition to his formal courses, I think it should be the result of an impelling force from within. If he has that, then the extra time and effort are not a burden and you have a willing, enthusiastic worker. Every facility should be placed at his disposal. . . . All restrictives should be removed in the case of exceptional students or exceptional circumstances. . . . In general, I do not see how we are going to develop medical scientists, or even have scientific physicians, unless we have the atmosphere of research constantly present and evident. Encourage those few with the spark, fan it into flame, and provide the fire with fuel. Every student in such an atmosphere can regard each patient he studies as a "research" problem, and will not

13. Davison, Wilbur C.: The Future of Medical Education. J. A. A. M. Colls., 21: 228 (July), 1946.

make his diagnosis until he has the evidence collected and evaluated. . . . We have had three recent students who did creative research while studying medicine. All three worked with almost complete freedom. . . . We have had none whom I can recall who worked in research in our department for financial gain alone."[14]

From our Junior Dean: "I have had the privilege of talking with and advising many students who were research-minded, and who were looking for a problem; or, who, on the other hand, had conceived a problem and were seeking direction and trying to find time and space in which to work. Such contacts have given me a fairly good insight into the factors operating in this Medical School with regard to our undergraduate students and their attitude toward research. Several attitudes are prevalent. The first and best of these is exemplified in the student who has become definitely intrigued by some phase of his study, either in the basis sciences or in clinical medicine, who seeks further information and who wishes to "try out" an idea. A second attitude is apparent in the student who seeks to become associated with an established research program in order to learn more in that particular area than otherwise could be done. A third attitude is seen in the needy student who seeks work as a research assistant to earn necessary funds while keeping in contact with developments in medical science. Finally, there is the pseudo, avid 'seeker after truth' sometimes known as the 'degree collector,' whose self-interest is the predominating motivation. . . . I most heartily favor the wider development of the honest 'undergraduate research' attitude. However, I feel very strongly that such a desirable end cannot be coerced; the student, who has no aptitude for research cannot have that aptitude developed by being required to perform some experiment and then write a paper,—the Senior Thesis method. He is likely to develop a distaste for research and research methods under such odious compulsion.

"I am certainly not sanguine enough to believe that potential research ability lies buried in every student; I imagine that the actual percentage is fairly small. I believe, however, that even that small group is, at present, neither stimulated nor encouraged to any appreciable degree. Those who do seek help and advice are too often brushed off, either politely or brusquely by the professor who is 'too busy.' If we are ever to enlarge the nucleus of research workers in medicine, and it is imperative to the future of our science that this group be enlarged, we must devise at once ways and means whereby the gifted and interested student can be encouraged,—can be boosted along until he emerges a full-fledged investigator. . . . While the majority of our present student body will never become research men, nevertheless, an attitude among the faculty, which encourages research by those students who are susceptible and capable, must inevitably result in inducing in the non-research student a growing respect for the scientific approach to all the problems he must meet and solve in his future practice of medicine. We must carefully nurture any budding research interest, however trivial it may at first appear, lest a possible prize-winning species be suppressed and supplanted by the flowering of a noxious weed, the medical iconoclast-hypocrit. . . . The question is far from

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14. Hudson, N. Paul: Dean of the Graduate School, Ohio State University.

simple. We are confronted with the choice, either of continuously preparing a few trained and devoted research workers, or of becoming a mere 'pill-peddler' factory. The latter attitude has too long prevailed in some quarters. It must be changed by developing through daily classroom and clinic contacts the type of student who repeatedly asks 'Why?,' 'What is the evidence?' The starting point would seem to be the faculty rather than the student body."[15]

The Professor of Human Genetics speaks: "The area of medical genetics offers an unusual and too often unappreciated opportunity for research by the medical student. More and more the genetic background in a wide range of specific clinical syndromes is being revealed as the basis for both preventive and curative measures. At the present time significant studies are being conducted under the direction of this Department, by undergraduate medical students both in this school of medicine and at Washington University, St. Louis. If research in medical genetics is not encouraged and initiated during student days, it is not likely to develop in later years."[15a]

From the basic sciences, pre-clinical group we have the following comments: A biochemist: "It is my opinion that perhaps the top 25 per cent of our undergraduate medical students are qualified to undertake research under supervision, and that such research can contribute substantially to their training as well as to the research programs in the several departments. In the remaining 75 per cent of students there will be a few who may be fundamentally interested in research and ultimately make good investigators. These latter are included because we do not presuppose that scholastic standing or grades alone qualify a man for investigative work. A number of undergraduate medical students (ten) have made important contributions to my own research program during the past decade resulting in 11 publications. In addition, approximately 10 more medical students worked in the department under my supervision although their results did not develop into published material. Of these, two developed into what I would call good research men in their present clinical fields, having remained in academic medicine; three additional students who took Ph.D. degrees in the department under the Graduate School are now taking or have taken their medical degrees. One of these men, who received his medical degree in September and who is now serving an internship in the same institution has just written me as follows: (October 20, 1946) 'I have found medicine quite interesting and well worth the energy required. One unfortunate thing here in this school has been the lack of emphasis on research. Practically all teachers here have been clinically minded, and so there has not been too much enthusiasm along research lines.' . . . May I add the following statements, which I believe to be self-evident. First: every reasonable effort should be made to create in our undergraduate medical students an interest in and appreciation of research in both the pre-clinical and clinical sciences. Second: Funds and laboratory resources should be available to implement this research interest. Third: Our better students have a much

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15. Dr. George H. Ruggy, Junior Dean.

15a. Dr. Laurence H. Snyder, Professor of Human Genetics.

broader and better training for a life of investigative work than most of their teachers. This being so, we should make every endeavor to attract from our student body creative medical scientists for the future. Fourth: While all departments have research programs, much more could be done to interest the undergraduate medical student in participating in these programs."[16]

A physiologist's plea: "I was a member of the faculty committee which originally inaugurated the system by which properly qualified students in this university may be granted graduate credit for research work taken in connection with medicine or dentistry. According to this plan, students registered in both the Graduate School and the College of Medicine may offer, not to exceed 15 quarter hours of selected, pertinent, B+ or above, quality-work required for the M.D. degree, toward a Master's Degree, or 45 quarter hours toward the Ph.D. degree, each to be earned and conferred in the special area of their choice. I have had three medical students take their Master's Degrees in Physiology with me in this way, resulting in publications appearing in the American Journal of Physiology and in the Journal of Nutrition, respectively. One of these students has since become a professional physiologist, currently on the faculty of a medical school, the other two are successful medical practitioners of exceptional ability. Another medical student, who carried on a research problem with me but failed to take her graduate degree, nevertheless published the results of her completed and detailed investigation in the Journal of Nutrition, and when I last heard from her in 1942 she was a medical missionary in India. She had retained her interest in research and was carrying on some interesting experiments among the natives of India with whom she was then working. . . . Whenever a medical student is found with an interest in research, it is important that this interest be fostered in every possible way. This is particularly true if his field of interest happens to be physiology. Occasionally a medical student becomes so interested in physiology that he gives up his plan to practice medicine and becomes a physiologist. (See Cannon.) The present acute scarcity of physiologists is largely due to our failure to encourage this sort of thing during the War. If we are to have properly trained young men to fill vacancies which are occurring with increasing frequency in the ranks of professional physiologists, we must do everything possible to interest the present medical students in this basic field. It is most essential that undergraduate medical students be encouraged to carry on research work in physiology, even if it means some delay in their attaining a coveted medical degree. Whether or not they continue basic physiologic teaching and research, a fundamental contribution to the entire science of medicine will have been made."[17]

A pathologist speaks: "I am most favorably inclined to having medical students undertake 'undergraduate research' in pathology, thus exposing themselves to research problems in medicine. In my department the participation of medical students in research is handled as follows: They are encouraged to work for a

16. Dr. J. B. Brown, Professor of Physiological Chemistry.
17. Dr. Fred A. Hitchcock, Professor of Physiology.

Master's Degree in Pathology by spending two consecutive summers full-time, with part time during the other quarters of course-requirements, completing the Master's Thesis ready for publication by the end of the senior medical year, thus receiving the two degrees at the same Commencement. Eight students have thus far received their Master's degrees in this program; three are currently working toward this end. About one in three has been dependent upon the financial support thus received; the others have turned down more remunerative jobs in order to pursue their research projects. The maximum remuneration available at the present time is $300 per year, provided either by interested private donors or grants-in-aid from the University's Research Foundation. I expect to increase the number of undergraduate medical students to the limit which our department can effectively direct in research, with mutual benefit to all concerned."[18]

A professor of research surgery reviews the past decade: "The introduction of opportunities for research into the undergraduate medical curriculum is a sound educational principle, thus commencing at an early period the basic training for a later career in medical research. Since its inception, the Department of Surgical Research has consistently developed the field of undergraduate student research. During the 10 years of its existence, undergraduate medical students have consistently worked in the department in various research capacities, particularly during vacations, but also in available time throughout the school year. During the past five years working conditions in our laboratory have been so interrupted by the War that it may not be considered a 'typical' period. Consequently, I am taking 1937-1941 as a more typical five year span. During this period, a total of 14 undergraduate medical students worked on surgical research problems in the department. Six of these did creditable independent investigations, which were eventually published. Six were registered in the Graduate School as well as in the College of Medicine, and eventually obtained their Master's degrees. During the first summer after completing their Freshman medical requirements, they worked with us as apprentices, learning the principles of research and determining the field in which each was to do his individual thesis. During the second summer the particular technics which were to be specifically applied were developed or acquired, perfected, and the collection of data was begun, which was usually completed by the end of the third summer. During the senior medical year the theses were prepared for final defense before a Medical Committee of the Graduate School, and publication. Five of the six were given their M. D. degrees and M. A. in Surgical Research at the same Convocation. We have been limited only by the strict limitation of available laboratory and clinical facilities which currently exists. . . . Of the 14 students passing through our department it may be stated that five were fundamentally interested in the subject under investigation for its own sake. The remainder were either also concerned in the incidental financial support, or in the broader aspects and applications to an anticipated clinical career."[19]

In the field of obstetrics and gynecology: "During the first year since our

18. Dr. Emmerich von Haam, Professor of Pathology.
19. Dr. George M. Curtis, Professor of Research Surgery.

new departmental reorganization, I have been consulted by three undergraduates, each with the request that he be permitted to participate in independent research. One of these men has completed a very good problem, the results of which are now in press in the Journal of Surgery, Gynecology and Obstetrics. The other two are now working. May I express the following purely personal opinions about student participation in medical research? In the first place, I think it should be available to every student on a par with other electives in the Medical School. In the second place, I think all semblance of pressure on the undergraduates should be avoided. The only motive should be a genuine interest on the part of the student with no academic preference resulting. In the third place, a student should be permitted to withdraw at any time without prejudice if unforeseen difficulties arise. Summarized: research opportunity for all with obligation to none."[20]

Along the same line Dr. Zapffe, writing me last May, had this to say: "When I published my curriculum in 1927 I made a strong plea for allotting time for student research. My thought was that everybody has a question mark in his mind at some time or other, so why not give him a chance to try and find the answer." (Personal communication.)

In 1930 there was established at this university a separate Department of Medical and Surgical Research in the Medical School with the definite objective of bringing into the midst of the medical faculty and undergraduate student body a group of full time investigators without routine teaching responsibilities. Here they were to work, and live, and exemplify those ideals ordinarily reserved for the ivory tower existence of the pure researcher in his remote laboratory, whom the student only knows by hearsay or legend. In the environment of a great university with its basic science departments and both premedical and medical students in abundance, a cooperative adventure has been undertaken, which extends literally from the University High School on the campus, through the various colleges, where both the social and natural sciences thrive, through Dental, Veterinary, Pharmacy and Medical Schools, with student and faculty personnel from each of these areas actively participating in various phases of research ultimately applicable to the better understanding of the preservation of human health and the prevention of disease with all of their social and economic implications. It is almost too late to start the ideal of creative scholarship in the undergraduate in medical school. Eminent powers of observation usually show themselves at an early age. Distinguished scholars and scientists are but persistent outstanding students some years advanced. With the biological sciences today paced by the dynamic fields of synthetic chemistry and nuclear physics, with students coming to us in increasing number with doctorates or their equivalent in basic science research already accomplished, and seeking their translation into terms of the life sciences, we in the medical faculties of today must place no barriers in their path, but rather make ready to welcome these students and provide the opportunities they will expect. Starting with the premedical, student-

20. Dr. Allen O. Barnes, Associate Professor Obstetrics and Gynecology.

investigator then, we have followed through with him in his medical course on the research level, and on into the intern, research fellowship and residency training years with ever increasing freedom and independence in his thinking. During this 16 year period there has been on the average at least one trained investigator each year who has gone out to take over his own group, usually in some medical teaching center, where he continues to create concentric rings of influence through the years. With or without extra degree credit, the satisfaction which these men now have in their teaching and investigation are sufficient recompense for any other sacrifices they may have made, I am told.

And now in the school where the Research Staff was to have no routine teaching or administrative responsibilities, the Director of Research has become the Dean of the College, and two other of his original associates have become chairmen of departments. It remains to be seen whether this means that the college will become in truth and in fact a mighty research institution, with every facility and every individual,—student, faculty member and employee,—dedicated to but one end, *more medical truth,* in the highest and most catholic sense, and as applied both to the theory and practice, of physic, or whether medical research cannot survive and maintain its existence and ideals in this supposedly utilitarian state university environment. It would seem that if the democratic way of life is to survive, it must be through the great universities of this land, and the spearhead of progress, if not human survival itself, will depend on the superlative mental and physical vigor of this nation, which is in the keeping of the men, young and mature, now in our medical colleges and represented here. Only under such circumstances may we hope for that tolerance and sound judgment, combined with the high art and fundamental science of living, so essential for the bringing of order out of chaos in our world today.

"I could smile," with John Ruskin, "when I hear the hopeful exultation of many at the new reach of worldly science and the vigor of worldly effort,—as if we were at the beginning of new days. There is thunder on the horizon, as well as the dawn."

I conclude with the admonition with which Alan Gregg closes his significant treatise on the "Furtherance of Medical Research": "In view of the rarity with which the abilities requisite for a fine research worker are joined in any man, the search for such persons should be deliberate yet eager, the training facilities catholic and discriminating, and our support loyal and reverent before the opportunity to be shown new truth."[21]

21. The Terry Lectures, New Haven, Yale University Press. 1941.

The Medical Educator of the Future*

LESTER J. EVANS
Medical Associate, The Commonwealth Fund
New York, N. Y.

In discussing any aspect of the future of medicine, it is necessary to take a brief look at its present status. Medicine is caught on the horns of a dilemma which its own progress has forced on it.[1] As it becomes more and more precise and scientific, specialization is inevitable. Specialization in turn adds to the fragmentation and segmentation of medicine. For the patient, whether well or sick, this means added difficulty in obtaining comprehensive medical care, when defined in terms of continuity, quality, and completeness of service. No short cut to the integration of specialized knowledge and skills into comprehensive medical care has yet been devised, but until this problem is solved, medicine—and the training for medicine—will be inadequate.

Our present educational system, especially in the graduate years, is geared primarily to the training of specialists and not to the integration of medicine. Even in the undergraduate years, the student sees medicine from a series of limited points of view. To become a specialist has seemed the desirable goal. Those students who do not become specialists by following a prescribed course of training to fit them for a specific task become general practitioners. They can be defined only negatively as non-specialists. They are the product of a hit-and-miss program of intern and resident training which has taken them into various fields, one after another, for a few months or more. Their teachers, in these fields, have been oriented to the specialist's point of view. By force of circumstance, or to hold patients, general practitioners so trained often cover a wide range of activities, many superficially and without adequate preparation. They are often looked on as subservient to the specialists—mere way-stations on the patient's road to competent care. This has come about because we have worked from the periphery of medicine—the specialties—toward the center, the patient and his physician and the relation between them—instead of beginning at the center.

However the practice of medicine may be organized in the future, I believe that the simplest road to comprehensive medicine is to train expert general physicians to do an essential job not covered by the present specialties. A necessary element of this job is continuity of contact between the patient and the physician. To maintain this continuity the physician must possess and demonstrate to the patient certain knowledge and skills which, as the patient can see, are crucial to his well-being and are not forthcoming from anyone else. This knowledge and these skills should, I believe, be geared to preventive services, or constructive medicine,[2,3] as some call it, and to the evaluation and treatment of emotional stresses as well as to the treatment of common illnesses by familiar medical tech-

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* Read at the Fifty-seventh Annual Meeting of the Association of American Medical Colleges, held at Edgewater Park, Mississippi, October 28-30, 1946.

1. Commonwealth Fund Annual Report, 1945.
2. E. J. STIEGLITZ: Pertinent Problems of Geriatric Medicine, *Ann. Int. Med.* 18: 89-95, 1943.
3. SMITH, GEDDES, and EVANS, LESTER J.: Preventive Medicine: An Attempt at a Definition. *Science*, 100: 39-42, 1944.

niques. What the general physician does in dealing with the patient's total problem will, then, prove quite as important to the patient as what the specialist does with one aspect of it. The pediatrician and the internist are the best examples now available of the general physician positively trained for continuing care of the patient; only a little reflection will indicate how much further most men in these "specialties" could go toward comprehensive medical care. There is no question here of opposition between general and specialized practice. There is a large and pressing question of relationship between two complementary aspects of medicine, with the general physician taking the lead in planning for the health of the patient.

I want to offer the thesis that if medical education could be oriented more to the training of the good general physician, the integration of medicine would be brought perceptibly nearer. Herein lies a major responsibility of the medical teacher.

The training of the general physician, as of any other physician, begins the day he enters medical school. Actually, it began long before, but here we are concerned with the foundation which is laid during his formal medical education. At the time of entrance to medical school, the student has confused ideas about medicine. However, he usually has an interest in people and some knowledge of them. He will learn many things from many sources, but his greatest task of self-education will be to fit the various parts into a logical and compelling philosophy of medicine. For the general physician at least, such a philosophy, I think, should be based on a thorough knowledge of people.

To help him build this philosophy, we might begin with his interest in people and make it easier for him to assemble and pull together what he needs to know about their behavior. I should like to suggest that the well and presumably "normal" person, in all stages of growth and development, both physical and emotional, from birth through senescence, be made the center of what might be called clinical study in the first years of medical school, just as the ill person is the center of clinical study in the last years. With a picture of the life pattern of the human organism in mind early, the student has the outlines, at least, of a framework to which he may relate, and in which he may integrate, the varied information he acquires concerning physical, physiological, and psychological phenomena of all age periods.

An experimental approach toward establishing an initial picture of the life pattern might be made through a series of well planned consecutive exercises in the first year or two. The students, in small groups, each with an instructor, could observe, talk with, examine as their training progressed, and describe living people of all age periods, beginning with the newborn and moving through the life span. The number and timing of these exercises could be arranged to fit the curricular requirements of that period. In group discussions and in whole class sessions with all the instructors concepts fundamental to all of medicine could be introduced and developed in terms of the students' own observations of living people.

To illustrate, physical growth and maturation could be demonstrated simply

and quickly through the changes which are seen to take place in the early years of life. The concept of the personality would have been introduced quite early when the students, in comparing their observations on young infants, noticed the differences in the response of the infants to them as strangers. Full appreciation of personality, however, would not come until the path of emotional development had been traced from infancy through childhood and adolescence into adult life. This could be done through instructor demonstrations, class lectures, and student study of a few basic emotional phenomena.

As the student extended his knowledge of individuals, other concepts or formulations, such as the range of "normal" variability, would come into view. Quite early in this series of exercises, the students, as they compared their group observations, would become more acutely conscious than they had been before entering medical school of the differences in people of the same age and sex. Differences in such gross things as height and weight would be obvious. Soon, such things as texture of the skin, fat distribution, and muscular development would be noted; then the response to a few simple physiological tests, and the reactions to conversation and questioning. Not only could the students thus learn to observe physical, physiological, and psychological variability but they would also come to realize that study of the normal individual can be as fascinating and challenging as study of the abnormal.

Study of the environment in which individuals are growing up and maturing would be another approach to describing them. Extensive investigation of the environment in any single instance could not be made, but the several elements of it, such as family composition, housing, occupation, gross dietary habits, and so forth, could be brought out and discussed in relation to the development and living habits of the individual. It seems to me that the concept of the organism-environment relationship should be introduced as early as possible because it is basic to the student's thinking about the whole range of human behavior. When, later, he begins to build for himself concepts of health and disease, he will naturally draw on what he has learned in these earlier experiences about organism-environment relationships.

The temptation is to go on at greater length but all that I have wanted to indicate is a way in which I believe the student could be aided by studying living people from the beginning of his career in the medical school. The intensity and scope of the exercises could be varied as much as desired. The orientation of the content, however, would always be, on the one hand, toward the subject matter of the first years and, on the other, toward what is to follow later in the curriculum. We would expect that the student thus introduced to medicine might be better prepared than he is now for what he is to hear and see when the emphasis of his instruction is on the diagnosis and treatment of disease.

Currently, there is active discussion of the importance of the environment in relation to the patient's illness, the recognition of early illness in the ambulant patient, and the diagnosis and treatment of the psychological or emotional aspects of illness. The student who has sensed the impact of environment on growth and development is equipped to begin analysis of the environment in the search

for factors involved in illness—those which disturb the equilibrium between the organism and its environment. The problems involved in the early diagnosis of disease would stand out clearly because he knows there is wide variability in healthy function and behavior. Understanding of psychological factors in medicine will come much more easily if he has learned that as the personality develops it takes on form and function just as the skeletal or vascular system.

Our thesis thus far is that the integration of medicine would be brought perceptibly nearer by the training of the good general physician, that the general physician offers the simplest road to comprehensive medical care, and that his training must rest on a sound knowledge of the human life pattern. The implication for the medical teacher of the future is obvious. He will have to be an integrator of specialized knowledge and skills as well as a discoverer and teacher of specific facts. There is no necessary conflict here between the teacher being a specialist and teaching the student who may become what might be called a "generalist." The individual teacher's task will be aided when there is a common ground of understanding and purpose between all teachers as regards educational objectives, the subject matter of the curriculum, and departmental responsibilities. The teaching and interpretation of the total function and behavior of the human organism is the obvious common denominator of medical education just as the learning of it is the core of the general physician's knowledge and skills needed in caring for people from day to day.

The introduction of the clinical study of the well person in the early part of the curriculum offers a logical background against which to teach the sciences that explain in detail the form, function, and behavior of living organisms. The subject matter and scientific method of anatomy, biochemistry, or physiology would, it seems to me, take on added significance for the student when he could draw on his knowledge to define the person he is studying today and not the ill one he hopes to see a year or two hence.

There has long been effort to coordinate and correlate the diversified subject matter of the medical curriculum, especially in the first years. Suggestions have been made that the anatomical or physiological system be made the point of correlation, that teaching be done by teams, that the normal be emphasized by contrasting it with the abnormal, and that, in order to hold the student's attention, he be given a taste of clinical medicine by being shown examples of the conditions seen in the so-called clinical years. I have elaborated on the thought behind these suggestions by proposing that clinical study of the general biological behavior of the living well person be made the focal point for the correlation and integration of the subject matter that deals largely with the normal. The teachers of such clinical study must be drawn from all over the school: the anatomist, psychiatrist, physiologist, internist and pediatrician, will be needed because of their specialized knowledge, but they will be most useful in so far as they are also teachers—and students—of human growth, development, and behavior.

The task of integrated teaching would not lessen in the graduate years when the general physician must become proficient in those skills which he needs in caring for the kind of people he will see in practice. Most of these people will

be ambulatory; they will come from a variety of family, occupational, and community environments; a large proportion will have no physical basis for their illness; and an increasing number will seek the doctor's help in keeping well. Learning to care for such patients will call for the proper blend of hospital ward, outpatient, and community experience, the opportunity to follow patients from the clinic to the wards and back into the clinic and into the home, and to give continuing health supervision between episodes of acute illness. Obviously, this training will have its roots in the present fields of internal medicine, pediatrics, and modern psychiatry, which will nourish the immediate development of medicine. As the science which deals with human emotions and interpersonal relationships, psychiatry is also an integrating factor in the understanding of total human function and behavior.

I am not particularly swayed by prevalent thoughts to the effect that general physicians are discriminated against, or that special recognition must be given them. All will admit, however, that if the general physician is to do the job we visualize for him, his position must be given dignity commensurate with the responsibility he will carry. He will first sense that dignity from his teachers if they display the energy and ingenuity necessary for his successful instruction. It is with their help that he must acquire the knowledge and skill which his patients will recognize as essential to their well being. The patients will respect the general physician when they see him as the doctor who, either alone or with the aid of others, helps them unravel their total problem in a way no one else does. The general physician himself will feel the dignity of his position when he is able, and is permitted, to take the lead in planning for his patient's health service. The degree to which he can do this will be in direct ratio to his understanding of his patient as a human being constantly struggling with the problems of life, whether they are economic or bacterial.

Of necessity I have spoken from a vantage point outside the medical school as I have never been a teacher, a worker in a laboratory, or a dean. I have been viewing medicine and the job of medical teachers and administrators in terms of the needs of patients and their physicians. When I was first asked to participate in this discussion it was suggested that I talk about the training of deans. I hesitated because I doubt that deans can deliberately be trained. However, their development can be fostered in a setting where there is clearcut and purposeful educational planning, such planning as is necessary for the kind of training I have indicated. The attitude of the dean and the way in which he conducts his office will determine, in large part, the degree and quality of such planning.

In this discussion I have talked about the medical educator of the future in terms of what I visualize to be one of his most important tasks—the training of the competent general physician. The general physician and his patient are central to the whole medical problem. In order that the physician may best be prepared to care for his patients from day to day, in health or in illness, I have suggested that he begin studying people from the day he enters medical school. As he and his teachers are able to integrate medicine in terms of the life pattern of human function and behavior, comprehensive medical care will be brought that much nearer to patients.

Integration and Organization of the Medical Curriculum*

C. C. CARPENTER
Dean, Bowman Gray School of Medicine of Wake Forest College
Winston-Salem, North Carolina

Five years ago the faculty of the Bowman Gray School of Medicine started a long range experiment in medical education and medical care. As in all investigations, some ideas proved to be good and others impractical. Experience and results with our program for integration of the curriculum, however, have satisfied us that the basic idea is sound and that further experimentation is warranted.

The word "integration" has several different meanings in academic circles. We use it to describe a teaching program that relates all the subjects in the medical curriculum to one another, emphasizing the study of the whole man in health and disease. It is an attempt to find a common point between different fields of knowledge and to place special emphasis on that point.

In the beginning, we recognized three major defects in the traditional medical curriculum: (1) departmental barriers, (2) lack of proper balance in subject emphasis, and (3) failure to correlate the various aspects of the science and art of medicine at the undergraduate level.

In experimenting with ways to overcome these defects, we began with horizontal correlation, bringing the patient into the fundamental science laboratory, and the fundamental sciences into the clinic and hospital ward. Our plan of horizontal correlation was reported by Harrell and Vann at the Detroit meeting of the Association of American Medical Colleges in 1944. A progress report was made by me at the meeting of the Southern Medical Association in 1945. In this paper, I propose to bring that aspect of the program up to date and to present a plan of organization which has recently been adopted in an effort to facilitate more effective vertical correlation.

HORIZONTAL CORRELATION

Our present program of horizontal correlation is shown in table 1.

The purpose of this program is to bring the student, throughout the entire medical course, face to face with the interrelationship between the traditional departments in his study of the science and art of medicine. Since the details of operation are much the same for each course, only one fundamental science and one clinical subject will be discussed in detail.

ANATOMY

GROSS: The teaching of gross anatomy is a subject of much discussion. Before medical knowledge reached its present proportions, the student was required to spend the greater portion of his time studying the gross structure of the body,

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and little attempt was made to apply this study to the care of the sick. As more and more has been learned about the medical sciences, it is no longer justifiable to devote long hours to the detailed study of gross anatomy. The extent of medical knowledge today prohibits the memorizing of facts, but makes it necessary to know where recorded facts may be found. The standard dictionary is used constantly, but only a fool would attempt to memorize the entire book.

TABLE 1.—HORIZONTAL CORRELATION OF THE MEDICAL CURRICULUM.

Subject	Taught by
FIRST YEAR	
Anatomy	Anatomist, pathologist, surgeon, radiologist, and psychiatrist
Biochemistry	Biochemist, internist, and surgeon
Physiology	Physiologist, internist, neurologist, and neurosurgeon
Bacteriology	Bacteriologist, internist, and pediatrician
SECOND YEAR	
Pathology	Pathologist, internist, surgeon, physiologist, and radiologist
Physiology	Physiologist, pathologist, pharmacologist, and internist
Pharmacology	Pharmacologist, physiologist, internist, biochemist, and surgeon
Physical Diagnosis	Internist, and anatomist
THIRD YEAR	
Medicine	Internist, physiologist, pathologist, biochemist, pharmacologist, and bacteriologist
Surgery	Surgeon, pathologist, anatomist, and biochemist
Obstetrics and Gynecology	Obstetrician, pathologist, and biochemist
Pediatrics	Pediatrician, bacteriologist, obstetrician, and psychiatrist
FOURTH YEAR	
This is essentially a rotating internship that sums up all subjects in the curriculum.	

Our object in teaching gross anatomy is to guide the student to an understanding of the structure of the human body and its relation to problems presented in health and disease. The traditional course is given during the first eleven weeks of the curriculum, but total instruction on the subject goes much beyond that point. In the dissecting laboratory, the structures are felt, traced out and dissected. Anatomists and clinicians are in the laboratory at each period to direct the study.

Each Saturday morning during the eleven weeks the class attends a clinic conducted by a surgeon, who presents a case related to the part of the body being studied. For illustration, if the layers of the abdominal wall have been observed during the previous week, an appendectomy case would be useful. The surgeon would avoid the subject of appendicitis, but would discuss the McBurney incision as it involves the three muscle layers and the peritoneum. The wound would be dressed during the clinic. It is most inspiring to observe the interest in the anatomy laboratory and the respect for gross anatomy which are stimulated by these clinics.

The radiologist also conducts a clinic once a week, using a case in which radiographic studies have proved to be of value in demonstrating structural variations from normal. Congenital abnormalities commonly confronted in medical practice are emphasized. In this way, the study of embryology is made interesting, and the student learns that an understanding of the perplexities of the pig embryo may prove to be useful.

Yet this type of correlation does not go far enough. The patient is a human being who always has some degree of mental reaction when he is sick. In order that the student may keep this fact before him, the psychiatrist meets the class in anatomy for one hour during each of the eleven weeks, and discusses emotional problems in normal people.

Further instruction in gross anatomy is given by the anatomist throughout the medical course. It is a part of the course in physical diagnosis and of the introductory course in obstetrics and gynecology. It is taught house officers who elect anatomy for their fundamental science in specialty training. The majority who do so are planning to specialize in general surgery or a surgical specialty.

MICROSCOPIC: Both the histologist and the pathologist are cytologists; they both concern themselves with the cell and its variations. The techniques and methods of studying normal and abnormal tissues are similar. The normal is not a single point on a graph, but a range of variations. Who is able to say with finality that a given cell is "normal" or that it is "pathological?" The traditional curriculum, however, implies that such a distinction can be made when it so sharply divides the study of histology and pathology. Further, the traditional histologist assumes that human material cannot be quite definitely enough "normal," and uses for study material from laboratory animals maintained under artificially induced conditions.

We try to present the subject of histology so that the student will envision the microscopic structural unit of the body, the cell, as a moving picture which is constantly changing as it develops, functions and suffers from deleterious effects. This presentation obviously requires correlation of effort by a group of people with special training in the various aspects of these changes. For that reason, we use both the histologist and the pathologist in teaching microscopic anatomy. It is our plan to add to the team an oncologist, a physiologist and an endocrinologist. The endocrinologist or gynecologist is especially important, because we know that abnormal cell activity is the basis for many gynecologic problems.

INTERNAL MEDICINE

The course in internal medicine illustrates our method of correlating clinical subjects with the fundamental sciences. The anatomist's participation in the course in physical diagnosis has already been mentioned. During the junior year, students acting as clinical clerks in medicine do the urinalysis and the bacteriologic and hematologic studies on patients assigned to them. They also perform simple physiologic studies on their patients, such as determinations of the vital capacity, measurements of the peripheral circulation and circulation time, and exercise tolerance tests. Many of these tests are done in the physiology laboratory, using the same apparatus that the students used on themselves earlier in their training.

Medical house officers, usually interns, take turns on the bacteriologic service, during which time they have no clinical duties. An assistant resident holds

a weekly two hour laboratory conference with the students and the intern assigned to bacteriology. A member of the staff of the Department of Bacteriology serves as consultant. Cases are referred to him that require technical skill or a knowledge of bacteriology beyond that required for a practitioner of medicine.

Sophomore students in physiology and pharmacology are assigned well selected cases on the medical service in order that they may study the functional changes seen in disease and the action of therapeutic agents in diseased patients. A member of the staff of the Department of Internal Medicine holds many of the weekly clinics for the sophomore students. An assistant medical resident is assigned to physiology and pharmacology, and makes ward rounds with juniors to study the cases presenting physiologic and pharmacologic problems. Fundamentals of pharmacology covered in the sophomore year are reviewed at the bedside. Therapeutic rounds are held for juniors by a member of the staff of the Medical Department once a week. Critical evaluation of therapy keeps patient care in harmony with sound fundamental principles.

The biochemist holds a clinic once a week for seniors, using a case in which the diagnosis and treatment depend to a large extent on chemical methods. The professor of physiology is trained in internal medicine as well as in physiology. He participates in teaching internal medicine at appropriate points and is often given special assignments in the clinical-pathological conferences.

Teaching schedules similar to those for anatomy and internal medicine are followed in every course throughout the curriculum. The student, intern, assistant resident, resident and instructor make up a unified team. Instruction in the fundamental sciences, undergraduate clinical instruction and graduate education for house officers are the concern of all members of the faculty.

VERTICAL CORRELATION

After following the schedule as outlined for four years, we were free of obstructing departmental barriers, and the various subjects in the curriculum were well correlated on a horizontal basis. We found, however, that the objective of proper balance in subject emphasis had not been satisfactorily obtained. It was evident that vertical as well as horizontal correlation was indicated. This year, the fifth year of our experiment, the departments were reorganized in an effort to facilitate correlation of the curriculum on a vertical basis. It was decided that the entire curriculum could be included in the four fundamental divisions of (1) structure, (2) function, (3) medicine and (4) surgery. A knowledge of structure and function of the body in health and disease is basic to all medical care, and all medical care uses either medical or surgical methods. Subjects were grouped together under these divisions as follows:

1. DIVISION OF STRUCTURE
   - Gross anatomy
   - Microscopic anatomy
   - Neuroanatomy
   - Pathology
   - Radiology

2. DIVISION OF FUNCTION
   - Physiology
   - Biochemistry
   - Pharmacology

3. DIVISION OF MEDICINE
   - Internal medicine
   - Preventive medicine
   - Neuropsychiatry
   - Pediatrics
   - Bacteriology

4. DIVISION OF SURGERY
   - General surgery
   - Neurosurgery
   - Ophthalmology
   - Otolaryngology
   - Orthopedics
   - Urology
   - Obstetrics and gynecology

CURRICULUM: Several years of experimentation will be required before full vertical correlation can wisely be instituted. Two schedules developed this year are illustrative of the plan.

The Divisions of Structure, Function and Medicine have the following schedule in operation: During the first two trimesters of the first year, the gross and microscopic structure of the normal body is considered. In the third trimester, general physiology is covered. In the first four weeks of the second year, general pathology is studied. The Divisions of Structure and Function jointly teach special pathology and special physiology and pharmacology during the remainder of the first trimester of the second year and during the second trimester. In this way, variations in structure and function resulting from disease are taught together, and at the same time the science of correcting these variations is studied. This plan also gives an intelligent introducion to the class in physical diagnosis that comes the following trimester.

The schedule as related to the study of the circulatory system and the disease subacute bacterial endocarditis serves to illustrate the plan:

	FIRST YEAR
First and second trimesters	Gross and microscopic structure of the heart and blood vessels (structure)
Third trimester	Physiology of the circulation (function)
	Bacteriology of organisms affecting the circulation (medicine)
	SECOND YEAR
First trimester	Injury and repair—thrombosis (structure)
Second trimester	Pathology of endocarditis (structure), physiologic changes in the circulation in endocarditis (function)
	Pharmacology of cardiac drugs and of antibiotics (function)
Third trimester	Review of the anatomy of the heart (structure); physical diagnosis of heart disease (medicine)

The structure, function, and diseases of the nervous system are taught throughout the four academic years by a group composed of a neuroanatomist, a neurophysiologist, a clinical neurologist and a neurosurgeon, each participating at all levels. Primary responsibility for each course falls on the person whose special

knowledge is most needed; for example, the neuroanatomist is responsible for neuroanatomy and the neurosurgeon for neurosurgery. The other members of the team assist with each course.

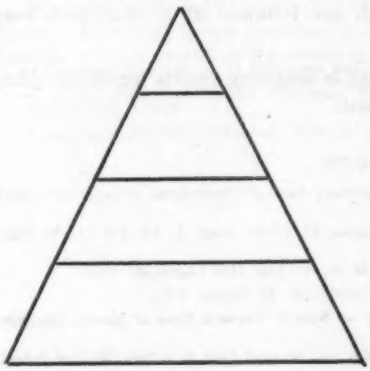
FACULTY: The structure of the faculty organization is designed to place all educational activities in one of the four divisions, but to retain intellectual freedom in scientific activity for each member of the faculty.

Each division has a chairman who serves essentially as a coordinator. He is responsible for maintaining the proper balance in emphasis among the various subjects in his division, for supervising the correlation of subjects and for working with other division chairmen in planning correlation between the divisions.

Each subject or department within each division has a director. He is responsible directly to the dean for the administration of intradepartmental affairs. He administers his own budget and plans his own research program. In educational matters he is responsible to the division chairman.

Faculty responsibility and authority in the operation of the school have a pyramidal pattern. The trustees of the medical school and hospital make the dean responsible to them and give him final authority in all matters within the school. The entire faculty serves in an advisory capacity. The plan of organization is illustrated as follows:

TABLE 2.—PYRAMIDAL PATTERN OF FACULTY RESPONSIBILITY



Dean and Medical Director.

Administrative Council (chairmen of divisions), meets weekly.

Faculty Advisory Council (chairmen of divisions and department directors), meets monthly.

Faculty (all who teach), meets quarterly.

Committees are appointed as they are indicated. We have a committee on grades and promotions for each of the four academic years, and a committee on admissions. When a vacancy occurs on the faculty, a committee is usually appointed to recommend someone to fill the place.

PROBLEMS OF THE CORRELATED PROGRAM

A curriculum so integrated and correlated presents two obvious problems: (1) For it to be most effective, a full staff is required; (2) it does not allow members of the staff long periods of time, entirely free from teaching duties, for

scientific research. While we feel a considerable degree of satisfaction with our correlated teaching program, it will not be most effective until the faculty is fully developed. This should present no problem to the older school, with a large faculty. The majority of medical schools, according to their published announcements are adequately staffed.

The lack of long periods of time entirely free from teaching duties may not prove to be a handicap. Free time for research should be guaranteed all members of the faculty in planning any curriculum. The total time spent in routine teaching should be no greater under a correlated curriculum than under the more traditional one. Doctors in clinical fields of medicine rarely enjoy long periods of time free from routine duties, but valuable contributions to the advancement of medical knowledge have been made by busy practitioners. Even if it is shown that short teaching assignments extending through two or more trimesters offer some handicap to research, the policy might be justified on the grounds that teaching is the most important function of a medical school.

CONCLUSIONS

1. Medical knowledge has become so extensive that, without well planned integration and correlation of the teaching program, the specialties tend to become isolated and the curriculum unbalanced.

2. The Bowman Gray School of Medicine of Wake Forest College has experimented with integration and organization for five years. The plans of horizontal and vertical correlation which are followed at present have been outlined and discussed.

3. After five years, the plan as outlined is obtaining results which are gratifying to both faculty members and students.

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Some Thoughts on Teaching Anatomy

GERHARDT VON BONIN
Department of Anatomy, College of Medicine
University of Illinois, Chicago

I. THE SCIENCE OF ANATOMY

Anatomy means literally "cutting up." Hence it could be defined as that science which is based on the method of dissection. It is customary, however, to define sciences by the object which they study rather than by their method. It has always been understood, even by those who coined the name "anatomy," that the object of this science was the study of the structure of the body, in particular of the human body. For the medical man a knowledge of the structure of the human body is obviously indispensable, hence anatomy has been pursued eagerly, and is nowadays, at least as far as "gross" anatomy is concerned, nearer to completion than any other scientific endeavor, with the possible exception of the map of the earth.

A nice long list of "nomina anatomica" was prepared and "officially" adopted in 1895. It has since been revised and is to be revised again. But these alterations and "repairs" are after all minor matters. A similar nomenclature for histology does not yet exist, but has been seriously contemplated. We are probably not very far from it.

All this cataloguing has left anatomists more dissatisfied than proud. After all, complete order, once understood, is never interesting. Moreover, the structure of the body proved intricate, but very difficult to think about. It still is, to a large extent, a stubborn fact which has to be accepted, described and analyzed. But to relate anatomical facts, to form abstract conceptions from those relations in the manner in which, e. g., physics or astronomy proceed, has very rarely happened, for reasons which are not far to seek.

Thinking is a fairly deeply ingrained desire of the human mind, and the need to rescue anatomy from the status of a dead description of facts has been felt more and more acutely as the centuries rolled by. The scholastic mind searching for essences, looking forward to a heavenly kingdom of eternal bliss could be satisfied with that perfect orderliness which the nomina anatomica represent. The modern scientist, realizing that the quest for (static) essences is a meaningless question and that relations and processes are the realities which are his legitimate objects can no longer be satisfied by pure description.

Human anatomy can become a science in the modern sense of that term only by going beyond the narrow confines of human anatomy. Two ways are open: To go beyond the "human" and to consider the human body (or, rather, its

structures) as the result of an historical process, or to go beyond "anatomy" and to consider the body as an engine the structure of which is one of the factors determining its function.

The historical approach can take two forms: embryology or phylogeny. Embryology has only recently, and only in spots, become more than a description of the kinematics of a process which in many instances was much more difficult to grasp than the adult structure it was to explain. How many students have labored over the development of the heart or of the internal genital organs without being thereby particularly enlightened about the adult organs? It must be admitted, of course, that modern experimental embryology goes deeper and is well on its way to add the dynamics to the kinematics of the classical embryology. But that leads finally back to genes, to inheritance and thereby to phylogeny.

The phylogenetic approach came to the fore under the influence of Darwinism and is even nowadays hardly separable from an evolutionary outlook. Enthusiastically begun in the second half of the 19th century, it ran into difficulties and led to so many disappointments that it has been abandoned by most workers and is in no position to be or even to become in the foreseeable future a reliable guide to anatomy. There are other, deeper reasons for this failure, but that is another story. In any event, phylogenetical speculations never became popular in American anatomy, except perhaps in the special field of neurology.

More promise is held out by the functional approach, although anatomy tends to become transformed in the process. It is almost impossible for one man to have a sufficient grasp on both structural and functional problems of all organs so as to do useful work and thinking along these lines. Specialization, as everybody knows, is necessary, and the functional approach tends to lead to a specialization at right angles, so to speak, to the present trend. Indeed, the scientific meetings of anatomy are already divided into sections on neurology, endocrinology, cytochemistry, etc. Neurology is probably farthest advanced as regards a functional approach. This is no merit of the neurologist, it is rather inherent in the case: In the nervous system more than anywhere else the function of any given center, or even cell depends upon its (anatomical) afferent and efferent connections. For many years the physiology of the brain was not much more than a paraphrasing of its anatomy. There are other chapters where a closer cooperation between anatomy and physiology could very well be effected. Secretion and absorption are examples which show not only the possibilities but also the limitations of functional approach. The body derives most of its energy, as everyone knows, from carbohydrates. But sugars, at least the mono- and di-saccharids which are immediately useful, are soluble and therefore escape the tools of the anatomists. So are, naturally, the first steps of carbohydrate metabolism. All these processes will remain the premise of the physiologist. But the channeling of the energy derived from the saccharids is determined by the struc-

tures which the anatomist observes. To show their exact role in the metabolic processes requires the combined efforts of anatomy and physiology. The connection between structures and function is very obvious, to name but one more example, in the muscle fiber. The molecular structure of the fibers has given us the key for the understanding of muscular contractions, the discovery that myosin is identical with adenosinetriphosphatase has given us further insight into the process of the channeling of energy.

These examples should suffice to prove the point that it is perfectly possible to elevate anatomy to a thinking science—in the sense defined previously—if the anatomist takes the trouble to go to school with the physiologist. It may even be hoped that this latter process may eventually be reversed, to the mutual benefit of both!

But even if anatomy would then become blessed with a clearly defined scientific goal, its role in the medical curriculum would, it is to be feared, still remain a little ambiguous. The medical practitioner is in many cases called upon to put his anatomical knowledge to severely practical uses. To plan his operative approach and procedure, the surgeon needs his anatomical atlas as much as a tourist needs a map of the country he is about to visit or a general the map of a country he is about to invade. The internist, too, bases his diagnosis on the postion and the size of an organ, such as heart, spleen, liver, etc. The role of anatomy in clinical medicine is much the same as that of geography in what the military mind calls nowadays "logistics." "Practical considerations" are beloved by many an anatomist, particularly so it seems, when he has only a Ph.D., but are scornfully despised by those who seem deadly afraid to see in their chosen profession the handmaid of medicine. Of course, these practical considerations are never much more than footnotes or, at best, paragraphs in small print. But it remains nevertheless true that anatomy suffers from a somewhat confused conception of its aims and its logical structure. Not that the individual anatomist is necessarily confused. He is in most cases perhaps just as clear about his science as the physicist or the chemist. But one only has to read a few issues of anatomical journals, or go to a few meetings to realize that anatomists do not all think or speak in the same terms. This lack of unity is bound to be reflected in the teaching of anatomy. By trying to do justice to all viewpoints the teacher often succeeds only in casting shadows upon every one of them.

II. THE TEACHING OF ANATOMY

This discussion of anatomy as a science was to bring out one of the fundamental difficulties of anatomical instruction. The actual work of instruction is not free from other, perhaps equally fundamental difficulties. Ever since Vesalius, nay even since Galen, anatomy has relied on dissection as its most important and obviously most effective teaching method. Animals were used by Galen, a few "prosections" were performed in the Middle Ages, dissections by the students themselves did not become feasible before the beginning of the nineteenth cen-

tury—and even then not without local difficulties, as e. g., in Edinburgh. But the course remained fundamentally the same.

A well organized course in dissection can teach the student all sorts of virtues which have frequently been extolled. He learns to observe, and to verify the written word. Occasional variations may lead him to the library and give him some inkling how to hunt up the literature. He can, if he has the right kind of instructor, acquire clean and precise working habits, almost as well as though he were apprenticed to a craftsman. He will be told how to care for his tools and keep them sharp and clean. He will, or may, acquire a certain amount of personal cleanliness, for few people like to eat their sandwiches with hands to which the odor of the cadaver still clings, or sit about in clothes greasy from the dissecting room. The student also gets, there is no doubt, a thorough knowledge of the human body. Yet it is rarely stressed that a dissecting course is all upside down, as it were. Vertebrates have, unfortunately endoskeletons. But the logical way to analyze any structure is to start out with that part which gives it its shape and holds it in place, then to proceed outward until the skin is reached and everything is smoothed and decently covered. The most stimulating textbook of anatomy ever written, that by Herman Braus, was laid out according to this plan. The freshman in medical school has, however, to take off the skin first, look laboriously for subcutaneous nerves, difficult to find (and, when all is said and done, very unimportant!), then to go deeper until he comes to the joints and their ligaments, by that time generally so dry that nothing can be seen any more. The student finally ends up with an unsightly mess of fragments, dried out, distorted, of no use to anybody. Eventually, a cart comes around with a big tank into which he can throw these mute witnesses of his first scientific endeavors, to turn with a sigh of relief to new fields of learning.

It is probably not so much the logical discrepancy between anatomical analysis and actual method of investigation which weighs with the student in the present method of training by dissection as rather the psychological effect. The morphological sciences are the only ones which instruct by teaching the student how to make chaos out of order. From a physical laboratory, the student brings home nice clean notebooks, full of graphs and constants, accurate to many significant figures, but the medical student works in the dissecting room on a cadaver that looks less and less human as his work proceeds, and has in his head impressions which frequently seem to be as chaotic as the remnants on his work table. Most sciences teach by construction, the biologists, unable to build up life, have necessarily to teach by dissection. It is not quite easy to evaluate how this experience affects the student, but some "demoralizing" (sit venia verbo) effect is almost unavoidable.

Little conscious effort is made as far as I can see to counteract this effect. Merely to bring these difficulties out into the open and to discuss them with the

students should help, just as psychoanalytic procedure helps (sometimes) by bringing problems into the focus of consciousness. Efforts at some sort of synthetizing work are being made here and there, and are a sign that the state of morphology is felt as being unsatisfactory. Montague Cobb's ingenious method of drawings are a case in point. Also, neurologists have frequently included the construction of brain models at least in graduate courses. To keep a "notebook" in histology and embryology is, of course, common practice.

There are other less fundamental problems in teaching anatomy, but they have been discussed sufficiently by others so that we may well leave them out of consideration here. That a coordinated course in human morphology is superior to separate courses in gross anatomy, histology, etc., is unquestionable, and coordinated courses appear to become more and more frequent. That the time alloted to anatomy in the medical curriculum is a matter for further discussion, is, I think, to be admitted, but this discussion should not be conducted so much by the anatomist as by the clinician.

What these lines were intended to convey was this: A clear definition of anatomy as the science which investigates first and foremost how structure determines function, and a method of teaching which has as its idea creation or, rather after-creation will do much to enhance the interest in, and the usefulness of, anatomy.

Teaching Students How to Interpret Neurologic Data

LESLIE A. OSBORN
Acting Head of the Department of Psychiatry
University of Buffalo School of Medicine
Buffalo, New York

Between the gathering of clinical evidence and the formulation of diagnosis and prognosis there is a highly important reasoning process which students often find difficult to master. Since treatment depends on the soundness of the physician's concept of the patient's problem, there is need to pay particular attention to the means by which the student reaches his diagnosis. The experienced clinician may go through rapidly—or even subconsciously—the correlation of facts and their linkage with the known, and the student may not realize that he must acquire such skill by slow-motion steps. The diagnostic process is the same in any phase of medicine, including psychiatry. In neurology, the degree of precision with which lesions can be localized and identified has become amazing in face of the complexity of the nervous system.

Unless carefully trained, students in clinical neurology may acquire vague or useless approaches to diagnosis, and neurology may remain a mystery to them forever. The student examines the patient, tries a chance symptom matching and guesses it might be, say, multiple sclerosis. He reads up Charcot's triad and other details in his textbook and feels partly equipped to talk about something when he presents the case. Perhaps he is versed enough in textbook descriptions to attempt direct pathologic diagnosis; but in my experience it is much sounder for him to establish anatomic diagnosis first. He hesitates in that, because it launches him in the perilous seas of neuroanatomy. He is all too apt to find the whole business confusing, and then like the bridge player he may decide a peek is better than a finesse and look up the chart to see what somebody else thinks about the case. Only a clearly understood logical method will stand the student in good stead later when he is on his own. He needs to be helped to learn how to analyze the evidence he has obtained clinically. Once he has mastered the process, he can apply it to any case which comes under his care.

Diagnosis consists of a true understanding of what is going on; it is not labeling. The questions in the outline below have been devised to help the student develop by successive steps the comprehension that is real diagnosis. This gives the basis for untreated and treated prognosis, and prepares for adequate management and effective treatment in so far as it is available. First developed and used by the author, and now used generally in our department of neurology, the outline is offered for possible wider application in medical education.

NEUROLOGIC INTERPRETATION

1. Has all possible evidence been obtained and reviewed? If not, what is missing?
   (a) Medical history and examination, with lab. and x-ray findings.

(b) Special neurologic examination.
(c) Special tests: spinal, fundi, fields, EEG, skull x-ray, etc.
(d) Mental Status; Rorschach, deterioration tests where indicated.

2. What evidence definitely points to a lesion of the central nervous system?

3. How long has there been a neurologic lesion (a) of present degree?
(b) of any degree?
Establish the course in time, progression, remission, new developments.

4. What anatomic lesions must be present to account for the clinical findings?
Try to localize the lesion: right or left side, level in brain or cord tracts or structures involved.
Could the lesion be single? Or must it be diffuse or patchy?

5. What pathologic entities could produce such anatomic lesions?
(a) Eliminate the types of condition which need not be considered:

Congenital	Infectious	Neuplastic	Vascular
Traumatic	Toxic	Degenerative	Functional

(b) Differentiate between those which should be considered and establish the diagnosis. If final differentiation is not possible, is there any further procedure which would clear up the doubt?

6. What is the prognosis: (a) Untreated?
(b) Treated?

7. What should management and treatment be?

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Financing Medical Schools

A most interesting series of papers on the financing of medical schools was presented at the Fifty-seventh Annual Meeting of the Association of American Medical Colleges held in Edgewater Park, Mississippi, in October, 1946. One of the objectives of these papers was to give authoritative information on the cost of medical education. State supported medical schools and the medical schools of endowed universities were represented in this symposium. One paper, read by Dr. H. G. Weiskotten, the dean of Syracuse University College of Medicine, presented data and figures on what in his opinion would be an acceptable budget. Dr. A. C. Furstenberg, dean, University of Michigan Medical School, discussed what he regards as an ideal budget, probably having in mind only a state supported medical school. There is considerable difference between these budgets. Mr. H. B. Wells, President, Indiana State University, presented a very detailed and complete analysis of the actual cost of operation of state supported medical schools. His figures were based on information received from state supported medical schools. Finally, Dr. Victor Johnson, secretary of the Council on Medical Education and Hospitals of the American Medical Association, discussed the part played by student fees in the support of a medical school.

Financing a medical school has always been a topic of intense interest to everyone, including the layman. People, generally, are under the impression that operating a medical school is a profit making business. Perhaps, this thought is a holdover from the earliest days of operating medical schools. Certainly, if medical schools ever operated with a profit, it must have been more than fifty years ago. For many years it has been the greatest contribution to education. No other school in the university is as costly as the medical school. Practically nothing has been published about actual cost of operation. Universities seem to be reluctant to release these figures. Why they should take that attitude remains an unanswered question. It would seem that if the public as a whole could be apprised of the exact state of affairs with regard to the financing of a medical school it would be willing through its legislatures and through its philanthropists to underwrite the cost of medical education, at least to the extent of making up the difference between student fees and the actual cost of operation. This cost is increasing year by year and at an alarming rate. It is only by giving out actual figures that we can expect understanding of this very important topic. When it can be shown that for every dollar given by the student the school lays down at least two or three dollars, and in some instances as high as six dollars, in order to give to the people men and women who are well prepared to look after them, both to keep them well and to make them well when they are sick. It is to be hoped that the papers mentioned above will arouse public interest sufficiently to insure a willingness to come to the assistance of the medical schools by providing adequate financial support.

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Internships

At the request of colleges and hospitals, the Committee on Internships and Residencies of the Association of American Medical Colleges will continue its efforts to establish uniform methods of

procedure for the filling of internships. A number of hospitals did not abide by the recommendations made by representatives of the three hospital associations, which created some confusion and a feeling that the efforts made by the committee had failed to attain the object aimed at. It was reported by a representative of the American Hospital Association that violations by hospitals was as high as 25 per cent; nevertheless, the American Hospital Association wants the system agreed to by all parties interested to be continued. It is even willing to have schools discipline hospitals for flagrant violations.

In the report made by the Committee on Internships and Residencies, it was recommended that all information concerning an applicant for an internship should come from the dean's office, and likewise all credentials. Faculty members should not furnish any letters of recommendation; in other words, every effort should be made to centralize all activities in the dean's office. It was also suggested that the hospitals be requested to eliminate statements from intern application blanks that the applicant will agree to accept an appointment if received.

A very marked change was made in the date of filing applications by students and the release of credentials by the school. The date recommended is October 15, 1947, for internships beginning July 1, 1948. The hospitals are requested to accept November 15, 1947, as the appointment date, and that they notify all applicants of acceptance, alternate position, or rejection, with the understanding that notification of rejection may be made by the hospital at any time. Hospitals should be notified that it is anticipated that dates for filing release of information and appointment will be moved further into the senior year in 1949.

It was agreed that the criteria of a satisfactory internship published in 1940 be revised, and a special committee to undertake that work was appointed. It was also agreed that the committee proceed with the preparation of another list of hospitals, based on their educational facilities and procedures for intern training. The uniform application blank adopted by the Association of American Medical Colleges, the Council on Medical Education and Hospitals of the American Medical Association, the American Hospital Association, the Catholic Hospital Association, and the Protestant Hospital Association will be revised.

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History of Medicine

The "history of medicine" is again represented in periodical literature by the "Journal of the History of Medicine and Allied Sciences," a quarterly published by Henry Schuman, New York. The editor is George Rosen; Miriam Drabkin is assistant editor. The list of consulting editors is a long one. Many countries are represented. The price is $7.50. The present number is the Anesthesia Centennial Number.

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Evaluation of Foreign Credentials

Not infrequently, applicants for admission to medical schools present foreign credentials. It has been well nigh impossible for admitting officers to evaluate these credentials. Now, the United States Office of Education, Division of International Educational Relations, offers its facilities for this job. Mr. Harold Benjamin, Director of the Division, Washington 25, D. C., is the person to contact. He requests that the applicant and the school submit to him the following data: 1. The original foreign credentials. 2. Two photostat or carbon copies of the original credentials. 3. The credentials must include titles of courses, number of foreign credits earned, grade in each course together with an explanation of the grading system. 4. Two authentic English translations.

College News

University of Tennessee
College of Medicine

Dr. Victor C. Myers, of Western Reserve University, was visiting professor of chemistry; and Dr. Joseph A. Brady, Fellow in Neurosurgery at the Mayo Clinic, was visiting instructor in anatomy; Dr. John L. Wood, formerly of Cornell Medical School, to associate professor of chemistry; Mr. J. B. Walker to instructor in chemistry; Dr. Edwin D. Murphey, formerly of Yale University, to instructor in pathology; Dr. R. R. Overman to assistant professor of physiology; Dr. Rulin Bruesch to professor of anatomy; Dr. R. H. Alden to associate professor of anatomy; Dr. W. L. Whittemore to instructor in anatomy, and Dr. J. H. Bushart to instructor in anatomy.

At commencement held recently graduates received their charge from Dr. George W. Corner, director of the Department of Embryology of the Carnegie Institution. His address was titled "Focal Point in Medicine." On October 31, R. J. Wiggers, professor and chairman of the Department of Physiology, Western Reserve University, addressed the students on "Physiology in Medicine."

The College of Medicine announces receipt of the following research grants: From the Jane Coffin Childs Memorial Fund, $2,500 to Dr. E. D. Murphey for cancer research; from the John and Mary R. Markle Foundation, $3,500 to Dr. J. O. Reese to study possible relationships between Bartonella infection and Rickettsia, and renewal of a $4,000 grant to Dr. D. H. Sprunt to continue work on the relation of amino acids and associated compounds to viril infections; to Dr. J. P. Quigley a $4,560 grant-in-aid from the U. S. Public Health Service to investigate pressures in the gastrointestinal tract in health and disease, and $400 from the Ella Sachs Plotz fund to study the site of action of certain emetics; to Drs. Packer, Hill and Overmann, to study the physiology of malaria in man, a $25,620 grant-in-aid from the U. S. Public Health Service; to Dr. T. S. Hill, for research on hypertension, $4,860 from the Life Insurance Research Fund; to the Department of Psychiatry, for the study of premenstrual tension and menstrual psychoses, a $12,090 grant-in-aid from the U. S. Public Health Service, and from the Rockefeller Foundation $7,500 for researches in psychophysiology; to Drs. Whitacre and Franklin a $2,500 grant-in-aid from the U. S. Public Health Service to study the use of penicillin in drops as prophylaxis against ophthalmia neonatorum.

CORRECTION: The professor and chief of the newly established Division of Physiology and Pharmacology is Dr. J. P. Quigley, not "John P." as stated in the November issue of the JOURNAL. Applications for the recently created Schering Fellowship should be made to Dr. Quigley, who will choose the acceptable candidate.

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University of Wisconsin
Medical School

Dr. Walter C. Alvarez, consultant in medicine, Mayo Clinic and professor of medicine, Mayo Foundation, University of Minnesota, delivered the Dr. Arthur S. Loevenhart Memorial Lecture December 5, 1946. This lecture is sponsored by Phi Delta Epsilon. Dr. Alvarez discussed the subject of "Headache."

Sir Lionel E. H. Whitby, C.V.O., M.C., M.A., M.D. (Cantab.), F.R.C.P. (Lond.), D.P.H., currently Regius Professor of Physics, Department of Medicine, University of Cambridge, and Honorary Consulting Haematologist to the Royal Army Medical Corps, delivered the A. C. Helmholz Lecture before the faculty and students November 19, 1946. The subject of his lecture was, "Haematologic Effects of Radiation."

Sir Lionel E. H. Whitby, with Lady Whitby and their daughter, sailed from New York on November 29, 1946, on their return trip to Great Britain. During his stay in this country, Sir Lionel served as Physician in Chief, pro tempore in the Peter Bent Brigham Hospital in Boston, and there delivered the Hunter Memorial Lecture. Later he was the guest of the University of Rochester School of Medicine and Dentistry, and gave the Eastman Memorial Lecture at that institution. Western Reserve Medical School in Cleveland and the College of Medicine of Ohio State University at Columbus invited Sir Lionel to lecture, and the University of Michigan was his host at Ann Arbor. He then delivered a lecture before the Chicago Institute of Medicine.

The annual Scientific Meeting for the associate teaching staff of Preceptors was held November 22 and 23. The preceptorial staff consists of physicians in various localities throughout the state, and carries out a part of the extramural teaching of senior medical students. Each fourth year medical student spends twelve weeks with one of the preceptorial groups. This is made possible by making the fourth year of the medical course twelve months instead of nine months.

From January 13 to 17 a series of brief intensive courses in cardiology will be given for Wisconsin physicians. This course is intended for the general practitioner and will be under the supervision of Drs. C. M. Kurtz and H. H. Shapiro, and the teaching staff will include other members of the medical faculty. The work will be fundamentally of a practical character intended to present the current diagnostic and therapeutic measures available. The fee will be $25 for the five day course.

A five day course in gastroenterology will start on Monday, February 10, 1947, and will extend through February 14. This offering will be under the direct supervision of Drs. K. L. Puestow and F. L. Weston, assisted by other members of the faculty and will be open primarily to physicians in Wisconsin. The fee for the course will be $25.

University of Illinois
College of Medicine

Dr. Douglas Robertson, professor of biochemistry, Middlesex Hospital Medical School, London, lectured at the University of Illinois College of Medicine November 8 on "The Nature of the Disturbed Calcium and Phosphorus Excretion in Thyrotoxicosis and Myxedema."

Dr. A. C. Ivy, vice president of the university, was ordered by the U. S. Government to go to Nurenberg, Germany, to serve as expert witness and adviser at the trials of Nazi doctors charged with crimes of a medical nature. He is special consultant to the Secretary of War. Dr. John B. Youmans, dean of the college of medicine, is American medical nutrition member of a 12-man commission now making a three-week survey of allied zones of occupation in Europe. The teaching and research facilities of the College of Medicine will be greatly expanded with the addition of a 13-story wing to the university's Research and Educational Hospitals.

Forty-two graduate physicians, drawn primarily from the staffs of state or federal hospitals, are enrolled in a 12-week course in neurology and psychiatry, now being given by a staff of specialists. Applications are being accepted by Dr. Ben W. Lichtenstein, director of the course, for a second identical course in the same subjects beginning in April, 1947, and extending through June. Tuition is free for physicians in Illinois state hospitals and university staff members, including fellows and residents. To others, it is $120. Veterans, however, receive books and tuition fees through the G. I. Bill of Rights.

A one year postgraduate course in pediatrics is now available. The course is under the direction of Dr. Henry G. Poncher, head of the department.

The Graduate School of the University has established four research fellowships to be awarded for one year in the fields of medicine, dentistry, and pharmacy at a stipend of $1,200 per year (calendar year with one month's vacation). Fellows are eligible for reappointment in competition with the new ap-

plicants. Candidates for these fellowships must have completed a training of not less than eight years beyond high school graduation.

Candidates should indicate the field of research in which they are interested and submit complete transcripts of their scholastic credits, together with the names of three former science teachers as references. Appointments will be announced January 1 or soon thereafter each year. The fellowship year begins September 1 or July 1. Detailed information and formal application blanks may be secured from the Secretary of the Committee on Graduate Work in Medicine, Dentistry, and Pharmacy, 1853 West Polk Street, Chicago 12, Illinois.

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University of Kansas
School of Medicine

New appointments at the Lawrence Division of the School of Medicine include the following: Dr. Kenneth E. Jochim, Ph.D., professor of physiology and head of the department; Dr. Russell C. Mills, Ph.D., assistant professor of biochemistry; Dr. Paul G. Roofe, Ph.D., professor of anatomy and head of the department; Dr. William C. Young, Ph.D., associate professor of anatomy.

New appointments at the Kansas City Division include: Dr. Tom R. Hamilton, assistant professor of pathology; Dr. Paul W. Schafer, assistant professor of surgery; Dr. William L. Valk, associate professor of urology; Dr. Edward G. McGavran, professor of public health and preventive medicine, and Dr. William F. Roth, Jr., professor of psychiatry. Dr. McGavran becomes a full-time head of the department of public health and preventive medicine and Dr. Roth is the new full-time head of the department of psychiatry and neurology.

In the process of returning to the prewar schedule effective next Fall the faculty of the school of medicine is providing an elective trimester for the period March 24-June 14, 1947, during which the present Juniors and Seniors may choose from the elective courses being offered or may accept hospital externships, internships or apprentice practice with physicians, subject to the approval and under the continued supervision of the faculty, thereby bridging over the three month period before the regular summer vacation months.

Deaths of Faculty Members: Dr. Logan Clendening, professor of clinical medicine and history of medicine; Dr. Arthur E. Hertzler, professor (emeritus) of surgery, and Dr. Earl C. Padgett, professor of clinical surgery.

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University of California
Medical School

Increased enrollment of students in the physical therapy training course of the Medical School has been made possible by a grant of $6,336 from the National Foundation for Infantile Paralysis, New York. Among the teaching essentials aided, the new grant will provide 236 semester hours in anatomy, physics, pathology, physiology, nursing, pediatrics and neurology. The courses, given under the direction of Dr. Frances Baker, include specialized treatment of infantile paralysis patients. To date, the national foundation has provided the Medical School with $14,336 to aid in the training of physical therapists at that institution.

The Medical School will receive a bequest valued at $592,065 to carry on research for a cure of cancer. The benefaction is made possible from the estate of the late Albert C. Hooper, Palo Alto philanthropist. Mr. Hooper's uncle, George Williams Hooper, and his wife, Mrs. Sophronia Hooper, were responsible for the establishment at the university of the Hooper Foundation for Medical Research.

The Frank Worthington Lynch Memorial Fund for Cancer Research was recently established as a perpetual memorial fund to Dr. Lynch, who at the time of his death was professor of surgery and gynecology. The fund will finance special research in the history of cancer started by Dr. Lynch some thirty years ago. Dr. Herbert F. Traut, professor of

surgery and gynecology and successor to Dr. Lynch, is in charge of continuing the research under the fund. Other sponsors are Dr. George Ebright, associate clinical professor of medicine emeritus, and Dr. William B. Thompson, Los Angeles.

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Boston University
School of Medicine

The department of psychiatry has been expanded to meet current need for more psychiatrists.

New appointees are: Dr. John M. Murray, professor of clinical psychiatry; Dr. George E. Gardner, associate professor of psychiatry; Dr. Marian C. Putnam, instructor in psychiatry; Dr. Beata Rank, assistant in psychiatry; Dr. Benjamin Cohen, instructor in psychiatry; Dr. Elvin V. Semrod, assistant professor in medicine; Dr. Frederick Rosenheim, assistant professor of psychiatry. Dr. John Murray, Chief Senior Consultant in Neuropsychiatry to the New England branch of the Veterans' Administration, and during the war chief of the Neuropsychiatric Branch of the Army Air Forces, will serve as professor of clinical psychiatry.

Two professors are doing research work through contracts awarded the school by the Office of Naval Research. Dr. Burnham S. Walker, professor of biochemistry, was awarded one contract to work on the chemistry of staphylococcal coagulase, and the other contract is to support the studies of Dr. Roger C. Crafts, assistant professor of anatomy, in "The Role of the Hypophysis in Iron Metabolism."

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University of Rochester
School of Medicine

Dr. George H. Whipple received the honorary degree, Doctor of Laws, from the University of Buffalo on October 4, at the convocation celebrating the centennial of the university.

Dr. Bloor recently received a new grant from the Donner Foundations, Inc., Cancer Research Division. The grant is for the use of Dr. Frances L. Haven, who is continuing her study of tumor tissue. Dr. Alexander J. Dounce is also the recipient of a grant from the Donner Foundation. Dr. Dounce is now resuming his investigations on the cytochemical approach to cancer research after three years' work for the Manhattan Project.

Dr. Curtis H. Baylor, formerly a member of the resident staff, who has been associated with the American University, Beirut, Lebanon, since 1938, has been appointed assistant professor of medicine for one year while on leave from Beirut.

Dr. George Packer Berry, assistant dean and professor of bacteriology, participated as a member of the U. S. Navy, in the project at Bikini, studying some of the effects of the atom bomb.

Dr. Berry, on nomination of the Society of American Bacteriologists, has received an appointment for three years as a member of the National Research Council (Division of Medical Sciences). The Rochester Regional Hospital Council has asked Dr. Berry to serve as Consultant in Medical Education.

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Yale University Medical School

A program of postgraduate studies for former medical officers discharged from the armed forces has proved highly successful in its first year of operation. The program was inaugurated a year ago on an experimental basis. Its purpose is to fill in the gaps in the research work and hospital training of the younger men in medicine whose training was radically curtailed by virtue of service in the armed forces. The course comprises a full academic year or more of advanced training in any field of medical science or clinical medicine in which the returned veteran intends to specialize. Of the 70 in the course, 35 are staying on for a second year of advanced study.

An externship in developmental diagnosis has been established. It is a 12 months' appointment, beginning some time prior to May 1, 1947. The stipend is $2,000. Prerequisites: Medical degree

with previous internship in pediatrics or neuropsychiatry, and intention to specialize in the field of developmental pediatrics or pediatric psychiatry. The extern will be on the staff of the Clinic of Child Development and will be trained to active participation in the diagnostic and advisory services which embrace a wide range of normal, defective and deviant developmental conditions. Application may be made by interview or by an informal letter specifying background, interest and sponsors. Address: Dr. Arnold Gesell, Director of the Clinic of Child Development, 14 Davenport Avenue, New Haven, Conn.

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New York University
College of Medicine

Four physicians specializing in diseases of the eye and enrolled in the advanced course offered by the college, received $500 under the scholarship plan set up by the New York Lions Club. These four scholarships have been made available each year.

The department of preventive medicine has received a grant-in-aid from the American Foundation for Tropical Medicine to assist in establishing a unit for the development of tropical medicine and parasitology in connection with Bellevue Hospital. The unit will consist of a clinician, Dr. Harry Most, a parasitologist, Donald V. Moore, Ph.D., and a technician. A diagnostic laboratory will be set up in connection with the third (New York University) division of Bellevue Hospital for the examination of blood and fecal specimens. The laboratory will also serve other divisions of the hospital as examinations are requested. It will also furnish teaching material for medical students. Dr. Most and Dr. Moore will act as consultants to the clinical staff and will conduct the teaching program in tropical medicine and parasitic deases.

Dr. Norman Spitzer has been appointed Robert Trubek fellow in rheumatic disorders for 1946-1947. The fellowship, which carries a stipend of $2,500, provides for a year of supervised research and special clinical training in rheumatic disorders at the College of Medicine and Bellevue Hospital.

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University of Chicago
Medical School

Dr. Charles H. Swift, associate professor and secretary of the department of anatomy, has been retired with emeritus status.

The Goldblatt Brothers Foundation has given $1,000,000 to establish the Nathan Goldblatt Memorial Hospital. As a clinical center the hospital will be devoted exclusively to the treatment of cancer and other neoplastic diseases. The hospital will be built to connect with the surgical section of Billings Hospital of the university clinics. The Nathan Goldblatt memorial will be the only university hospital in the country with the entire staff engaged full time in cancer treatment and research. The hospital also will be the focus of the University of Chicago's Committee on Cancer and its associated Committee on Normal and Neoplastic Growth, which coordinate research on cancer in nine clinical and basic science departments. In addition to the present research facilities, significant additional resources will be added soon by the laboratories of the university's Institute of Radiobiology and Biophysics and its Institute of Nuclear Studies. Both institutes already have complete staffs.

Dr. Frank R. Spencer, professor and head of the department of ear, nose and throat, will retire in June.

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University of Texas
Medical Branch

The Riverside County Medical Society of Southern California held a dinner meeting November 9th to commemorate the centennial of ether anesthesia. Chauncey D. Leake, Ph.D., vice-president, University of Texas Medical Branch, was the principal speaker. Among the guests were Dr. John Parkinson, the London cardiologist.

The Medical Branch is host to two

Brazilian physicians, Dr. Emmanuel Dias and Dr. F. Laranja, both members of the Oswaldo Cruze Institute, Rio De Janeiro. Dr. Dias and Dr. Laranja will visit the Scott-White Clinic in Temple and conduct field trips for the study of possible cases of Chagas' disease in Texas. This study will be made in cooperation with Ardzronny Packchanian, Ph.D., Director of the Microbiology Laboratory.

Doctor Robert Davis, formerly associated with the Department of Psychiatry of the University of Colorado School of Medicine, has been appointed associate professor of neuro-psychiatry and assistant director of the Galveston State Psychopathic Hospital.

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Washington University
School of Medicine

Dr. Ernest Sachs, a member of the faculty for 35 years, has retired as professor of neurological surgery. He will continue to train graduate students.

The School of Medicine has concluded an agreement to advise on the health services and research carried on at the Los Alamos Project, near Santa Fe, N. M. A medical advisory board has been appointed. Members of the board are: Dr. Philip Shaffer, Distinguished Service Professor of biological chemistry; Dr. Carl V. Moore, professor of internal medicine; Dr. Frank R. Bradley, director of Barnes Hospital; Dr. Otto Brandhorst, dean of the School of Dentistry; Dr. Nathan Womack, associate professor of clinical surgery; Dr. James Nolan, assistant professor of obstetrics and gynecology, and Dr. Robert A. Moore, acting dean.

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University of Toronto
Faculty of Medicine

Dr. Herman B. Van Wyck has been appointed professor of gynecology and obstetrics, succeeding Dr. William A. Scott, who is retiring. Louis B. Jaques, Ph.D., has resigned from the department of physiology, to become professor and head of the department of physiology, University of Saskatchewan, Saskatoon, Canada.

Dr. Bernardo A. Houssay, professor of physiology, University of Buenos Aires, delivered the annual Charles Mickle Lecture, September 19, on "Alloxan Diabetes." Dr. Houssay delivered the lecture in his holding of the Charles Mickle Fellowship, which he was awarded in 1945. The fellowship is given annually by the University of Toronto Faculty of Medicine to "that member of the medical profession who is considered by the council of the faculty of medicine to have done most during the preceding ten years to advance sound knowledge of a practical kind in medical art or science."

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University of Colorado
School of Medicine

Dr. Franklin P. Gengenbach, Denver, has been appointed professor emeritus of pediatrics. He has been a volunteer faculty member since 1911. He had been professor of pediatrics and head of the department from 1930 until his retirement on October 1.

A grant of $3,000 was presented to Bernard B. Longwell, Ph.D., associate professor of biochemistry by the Ciba Company. Dr. Longwell, in collaboration with Frank X. Gassner, D.V.M., professor of animal pathology at Colorado State College of Agriculture and Mechanic Arts, Fort Collins, is working on the possible extraction of hormones from animal feces for use in the treatment of sterility in cattle. A grant also was made to Dr. Harry H. Gordon, professor of pediatrics, by the Mead Johnson Company. Dr. Gordon is studying the metabolism of premature babies.

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Western Reserve University
School of Medicine

Under two grants totaling $7,000 from the U. S. Public Health Service Dr. Roy W. Scott, professor of clinical medicine, and his associates at University and City hospitals in Cleveland, will administer carefully controlled doses of Dicumarol (3-3'-methylene-bis-[hy-

droxycoumarin]) to men and women hospitalized after attacks of coronary occlusion. As president of the American Heart Association last year Dr. Scott appointed a committee to direct a cooperative study of Dicumarol by several institutions. For this study the U. S. Public Health Service has contributed a total of $35,000. At University Hospitals the program is being conducted by Dr. Joseph M. Hayman, Jr., professor of clinical medicine and therapeutics at Western Reserve, and Dr. Harold Feil, associate clinical professor of medicine.

Student Prize.—Through the cooperation of Mead Johnson and Company and the Museum of the Cleveland Medical Library, a prize of $100 is offered to the student in the school of medicine of Western Reserve University submitting the best thesis on a subject relating to the history of medicine.

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St. Louis University
School of Medicine

Faculty Changes: Percy J. Carroll, M.D. (Brigadier General, U. S. Army M. C., retired), assistant dean and professor of public health; Mark C. Wheelock, M.D., of the University of Alabama, assistant professor of pathology; Paul Murphy, B.S., M.D., of Washington University, assistant professor of clinical medicine; Benjamin DeBoer, A.M., Ph.D., of the University of Missouri, assistant professor of pharmacology; Douglas E. Smith, M.A., Ph.D., of Ohio State University, senior instructor in physiology; Norman M. Sulkin, M.A., Ph.D., of the State University of Iowa, instructor in anatomy.

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Indiana University
School of Medicine

The school has received a grant of $15,000 from the National Institute of Health, U. S. Public Health Service, to study the organisms concerned in the cause of gas gangrene of man and certain animals. Leland S. McClung, Ph.D., associate professor of bacteriology, will be in charge of the program, and certain parts of the work will be done in cooperation with Harry G. Day, Sc. D., associate professor of chemistry.

The Osterman prizes were awarded to 18 students for outstanding papers submitted. The prizes ranged from $5 to $15. These prizes were established by Mr. H. Osterman in 1939.

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Mayo Foundation for Medical Education and Research

The Foundation was presented with the award of the American Pharmaceutical Manufacturers' Association at its meeting in New York, December 9, in recognition of its great contributions to public health, by fundamental research in the field of medical sciences, for the profound and lasting benefit of mankind. Isaiah Bowman, LL.D., president, Johns Hopkins University, made the presentation address and Dr. Donald C. Balfour, director, Mayo Foundation for Medical Education and Research, Minneapolis, the speech of acceptance.

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Medical College of Alabama

Dr. J. K. Cline, associate professor of biochemistry, has received two grants to support his researches. Distillation Products, Inc., awarded him $2,500 for research in Vitamin E therapy and a grant of $7,500 was made by the Research Corporation for a study of antianemic substances.

Dr. Joseph F. A. McManus has been appointed assistant professor of anatomy; Dr. Clarence E. Klapper, assistant professor of anatomy, and Margaret S. Klapper, instructor in medicine.

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Jefferson Medical College

The Annual Lecture given by the Alpha Omega Alpha Honorary Medical Society of Jefferson was delivered November 7, 1946. The speaker was Dr. Charles Herbert Best, professor and head of the Department of Physiology and director of the Banting-Best Department of Medical Research, University of Toronto, Canada.

Long Island College of Medicine

Progress toward the proposed $16,000,000 medical center in Brooklyn planned by the college was marked by a "First Milestone" dinner. Thus far $610,698 has been subscribed toward the new campus and buildings, which, when completed, will give this part of Greater New York its first medical center.

Dr. A. W. Martin Marino, general chairman of the Alumni Memorial Fund Campaign for $350,000, announced that graduates had passed their goal by subscribing a total of $351,320. These funds will be used to erect one unit of the basic science laboratory as a memorial to those alumni who died in service in World War II.

George D. Olds, chairman of the executive committee of the board of trustees, reported that a total of $259,378 had been received from trustees, parents, faculty members and friends of the institution.

Endorsement of the college's long-range program came from Dr. Alan Gregg, director of medical sciences, the Rockefeller Foundation, Dr. Lester J. Evans, medical associate, the Commonwealth Fund, and John Cashmore, borough president of Brooklyn. The goal by the end of 1948 is $5,450,000, which will provide the main teaching and research laboratory planned as the first of the college's four units at the Clarkson Avenue site. It will also provide for purchase and improvement of the land and will establish a five-year operating fund to assure continued high standards of teaching, research and service. Other units planned here are a medical library, a dormitory and an auditorium.

At the college's present site on Henry Street in downtown Brooklyn, the buildings now utilized will be adapted to the needs of a graduate teaching and research center, including the college's activities in industrial and tropical medicine.

Ultimate cost of the buildings is estimated at $10,000,000 and an additional $6,000,000 will be sought for endowment and general support. The college aims to complete the project by its 100th anniversary in 1960.

Faculty changes: Dr. Charles A. Gordan, director of the department of obstetrics and gynecology, succeeding Dr. Alfred C. Beck; Dr. Morris Glass, Dr. Frank P. Light, Brooklyn, Dr. William Meagher, Brooklyn, Dr. J. Thornton Wallace, Jackson Heights, and Dr. George Hamilton, clinical professors in obstetrics and gynecology; Dr. Stuart A. Winning, Brooklyn, assistant clinical professor of surgery; Dr. William Dock, director of medicine on the College Division at Kings County Hospital; Dr. George H. Lordi, Dr. John B. D'Albora and Dr. Morris M. Banowitch, clinical professors in medicine; Dr. S. Charles Franco, assistant clinical professor in medicine; Drs. John Pepe and Leo A. Harrington, assistant clinical professors in radiology; Dr. Thurman B. Givan, professor of clinical pediatrics; Dr. Emil Smith, assistant clinical professor of pediatrics. Dr. Robert L. Moorhead retired as executive head of the department of otolaryngology with the rank of emeritus professor of otolaryngology.

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University of Utah
School of Medicine

A grant of $27,750 has been received for the further support of a study of muscular dystrophy and other hereditary and degenerative disorders. This supplements the grant of $92,000 made last year by the U. S. Public Health Service, Research Grants Division, for the same purpose. With these funds it has been possible to establish a Laboratory for the Study of Hereditary and Metabolic Disorders, of which Dr. Maxwell M. Wintrobe, professor and head of the department of medicine, is director. The activities of this laboratory will be divided among three divisions: the division of biochemistry and physiology, of which Francis Binkley, Ph.D., New York, and Emil L. Smith, Ph.D., are in charge; the division of genetics with Fayette B. Stephens, Ph.D., in charge and the clini-

cal division. The chief of the clinical division, who will also act as assistant director of the study, has not yet been selected. A metabolic ward at the Salt Lake General Hospital forms part of the clinical division. The staff of the metabolic ward includes Dr. Virginia Davenport. Dr. Binkley is associate research professor of biochemistry and medicine. Dr. Emil L. Smith is associate research professor of biochemistry and physiology.

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Wayne University
College of Medicine

The United States Public Health Service has awarded a grant of $10,000 in support of research on "The Pharmacology of Synaptic Function" to be carried on in the Department of Pharmacology and Therapeutics under the direction of Dr. Amedeo S. Marrazzi, head of the department. The work will utilize electrical methods developed by Dr. Marrazzi for the study of drug actions on the nervous system.

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Tulane University of Louisiana
School of Medicine

The B. Bernard Weinstein Gynecological Research Fund has been created by patients and friends of Dr. Weinstein, assistant professor of gynecology. The interest derived from this fund is to be used for research in gynecology and is available to any member of the staff of Tulane University doing research in the field.

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College of Medical Evangelists

The college announces the organization of a graduate school of medicine, giving courses on the graduate level featuring the basic sciences as related to the major clinical specialties. The second course in the basic studies relating to surgery is now in progress. Nine months' courses are also being offered in internal medicine and in obstetrics and gynecology. These basic science courses are planned primarily for physicians who are working toward certification by their respective American specialty boards.

Northwestern University
Medical School

Dr. Albert M. Snell, professor of medicine in the Mayo Foundation, delivered the annual Stephen Walter Ranson Lecture December 3. His subject was, "Recent Advances in the Field of Hepatic and Biliary Disease."

Dr. Jules H. Masserman, assistant professor of nervous and mental diseases, has been cited by the Lasker Foundation for his outstanding research in psychiatry and its application to mental hygiene.

New Appointments: Dr. Ray S. Snider, associate professor of anatomy; Dr. John M. Brookhart, assistant professor of neurology.

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George Washington University
School of Medicine

The next intensive postgraduate course in ophthalmology will be given February 3-8 inclusive. Guest lecturers will assist the resident staff in carrying out the program.

The tenth annual postgraduate course in ocular surgery, pathology and orthopedics will be given during the week of January 27-February 1. This is a practical course and is limited to thirty participants. For further details of the postgraduate courses in ophthalmology write to the secretary, Mary E. Kramer, Suite 34, 1801 K Street, N.W., Washington 6.

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University of Maryland
School of Medicine

The John and Mary R. Markle Foundation awarded a grant of $3,000 to the Department of Pharmacology for work on the study of the excretion, metabolism, and a method for the determination of blood levels of Theophylline. The work is under the direction of Dr. John C. Krantz, Jr., professor of pharmacology.

Dr. George B. Eusterman, Mayo Clinic, Rochester, Minn., gave the first annual Dr. Julius Friedenwald Memorial Lecture. His subject was "Newer Phases of Gastroduodenal Ulcer."

Cornell University Medical College

Dr. Harold L. Temple has been promoted to a professorship in radiology.

The department of pharmacology of Cornell University Medical College has accepted a research grant from the Cinchona Products Institute of New York for a study of the effects of cinchona alkaloids on heart arrhythmias. The work is to be carried on under the direction of Dr. Harry Gold, using various alkaloids of high purity, especially manufactured for this study by N. V. Nederlansche Kaninefabriek, Maarssen, the Netherlands.

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Georgetown University School of Medicine

CORRECTION: The Reverend Paul A. McNally, S.J., is dean and regent.

New Appointments: Dr. Charles F. Geschickter, professor and director of the department of pathology; Dr. Walter C. Hess, professor and director of the department of biochemistry; Dr. Lloyd G. Lewis, associate professor of urology; Dr. Chas. P. Howze, professor of clinical urology. Many instructors in various departments were also appointed.

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University of Virginia Department of Medicine

On October 16th, Dr. Charles Mann, of E. R. Squibb & Sons, presented to the student body three films on the use of penicillin.

Dr. H. B. Mulholland has been appointed a member of the Metabolic Disease Study Section of the National Institute of Health. He has also been appointed liaison member of the committee to coordinate medical activities, formerly the Committee on Prewar Medical Services.

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University of Minnesota Medical School

Dr. Nils Westermark of the University of Stockholm, Sweden, gave the Leo G. Rigler Lectureship November 26. His subject was "New Experimental Studies on Pulmonary Circulation."

Louisiana State University School of Medicine

Dr. Charles Mayo Goss has been appointed professor and head of the Department of Anatomy. Doctor Goss received the degree of Doctor of Medicine at Yale University in 1926 and has been on the faculties of Yale University, Columbia University and the University of Alabama. He has been head of the Department of Anatomy at the latter school since 1938.

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Columbia University College of Physicians and Surgeons

Dr. John S. Lockwood, since 1924 chief of the division of surgery, committee on medical research of the Office of Scientific Research and Development, has been appointed professor of surgery.

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University of South Dakota School of Medicine

Dr. Arthur W. Devor has been appointed an associate in chemistry. Dr. John Summers joins the faculty as an associate in anatomy.

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Johns Hopkins University School of Medicine

Dr. Russell H. Morgan, former associate professor of radiology at the University of Chicago, has been made professor of radiology in the Johns Hopkins University School of Medicine and radiologist in chief at the Johns Hopkins Hospital.

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Harvard Medical School

Dr. Maxwell Bovarnick has been appointed assistant professor of bacteriology and immunology; Dr. Seymour J. Gray and Dr. DeWitt Stetten, Jr., assistant professors of medicine.

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Southwestern Medical College

The First Texas Chemical Manufacturing Company has awarded a grant of $5,000 for carrying on research work in the department of pharmacology.

Duke University
School of Medicine

The Ninth Annual Medical Symposium, arranged by the University and the staff of Duke Hospital, was held October 4 and 5, 1946. The program was participated in by Dr. Eugene A. Stead, Jr., Dr. Louis K. Diamond, Dr. Alfred Blalock, Dr. Francis J. Braceland, Dr. Ralph M. Tovell, Dr. Mims Gage, Dr. Sumner L. Koch, Dr. Augustus Thorndike, Dr. Francis R. Dieuaide, Dr. Chester S. Keefer, Dr. Theodore J. Abernathy, Dr. John F. Mahoney, Dr. Chester M. Jones.

Dr. Eugene A. Stead will assume his duties as professor of medicine at the Duke University School of Medicine on January 1, 1947, filling the professorship held by Dr. Frederic M. Hanes, whose untimely death occurred last March.

A Veteran Refresher Course has been in operation since V-J Day. The facilities of the hospital have been turned over to the veterans. In addition the various services are using as many veterans as residents as there are places available. Dr. Lee E. Farr, director of research of the A. I. du Pont Institute, Wilmington, Delaware, addressed the staff and students of the hospital and nursing school October 17th. His subjects were: "Hemorrhagic Bright's Disease" and "Nephrosis." Dr. William Curry Moloney, hematological consultant for the Boston Catholic Hospitals, addressed the staff and the students of the hospital and the nursing school October 17th. His subjects were: "Homologous Serum Hepatitis in Civilian Practice" and "Some Clinical Aspects of the Antigenicity of the Human Red Blood Cell."

Under the direction of Dr. Norman F. Conant the Fungus Disease Registry is increasingly active. This registry supplies sets of teaching cultures for medical schools, maintains a diagnostic service that includes culture, histopathologic and serologic studies. The service is financed by a grant from the American Foundation for Tropical Medicine. A month's course in mycology is to be offered by this department during the summer of 1947. The exact date will be announced later.

At the meeting in Philadelphia of the Association of Medical Illustrators, Elon H. Clark was elected chairman of the Board of Governors, and Orville A. Parks was appointed chairman of the Southeastern Division.

Dr. George A. Watson of the department of pediatrics received a scholarship for the fall Graduate Instructional Course in Allergy at Jefferson Medical School, Philadelphia.

A special medical research building, making available 22,000 feet of animal and laboratory space is now well along in construction and should be ready for occupancy about March 1, 1947.

As an experiment in graduate teaching, the department of anatomy is offering a review of anatomy on a graduate level using motion pictures, lantern slides, and other visual aids. This review is offered as a part of the speciality program in neuropsychiatry and orthopedics. The course is conducted as round table discussions with panels including staff clinicians especially interested in the region of anatomy under discussion.

Dr. Raymond S. Crispell left Duke University on November 4th to assume the post of director of the Division of Neuropsychiatry for Branch No. 5 of the Veterans Administration with headquarters in Atlanta, Georgia. In addition he will be connected with the Emory University School of Medicine and the Georgia School of Technology.

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University of Pennsylvania
Graduate School of Medicine

Dr. Julius H. Comroe, Jr., formerly assistant professor of pharmacology, University of Pennsylvania School of Medicine, has been appointed professor of physiology and pharmacology in the university's graduate school of medicine.

General News

Psychology Training Center

A training center for clinical psychologists was formed recently when the Menninger Foundation School of Clinical Psychology at Topeka and the psychological staff of Winter General Hospital were placed under the direction of the University of Kansas Department of Psychology.

The growing need of clinical psychologists and psychometrists to staff the general hospitals of the Veterans' Administration led to this organization. Students will be paid by the Veterans' Administration under civil service during their time of study. They will complete about one-third of their work on the campus and two-thirds as interns at Winter General Hospital. Students will receive $1,200 for working a twenty-hour week at the hospital during the first year of their training, $1,500 the second year, and $1,800 the third and fourth years. Under the terms of the contract, students will enroll at the University, where examinations will be given and theses will be written under the direction of a committee from both the Lawrence and Topeka schools. The first class, limited to 20 graduate students, was scheduled to start in September. Veterans will be given preference.

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Fellowships in Medicine

The American College of Physicians offers a limited number of research fellowships, designed to provide an opportunity for research training either in the basic medical sciences or in the application of these sciences to clinical investigation. They are for the benefit of physicians who are in the early stages of their preparation for a teaching and investigative career in internal medicine, pediatrics and other allied fields. Assurance must be provided that the applicant will be acceptable, and the laboratory will supply the facilities necessary for the proper pursuit of the research. The term of appointment is for one year, usually beginning on July 1. The stipend will be from $1,800 to $3,000 a year. Application forms will be supplied on request to the American College of Physicians, 4200 Pine Street, Philadelphia 4, and must be submitted in duplicate, with a recent photograph of the applicant. It is desirable that applications be filed by December 1 each year. Awards will be made on or about January 1. Dr. Reginald Fitz, Boston, is chairman of the committee on fellowships and awards.

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Grants for Research

White Laboratories, Inc., Newark, has announced that its program for extramural research for the fiscal year 1946-1947 includes new grants or renewal of previous grants for experimental and clinical studies at the Jefferson Medical College, University of Pennsylvania School of Dentistry, Boston University School of Medicine, the Margaret Hague Maternity Hospital, Jersey City, Newark Beth Israel Hospital and other medical institutions. In the current fiscal year a sum approximating $40,000 has been allocated for such studies, which include problems related to bacteriology, oral medicine and surgery, hematology, nutrition, endocrinology and veterinary medicine.

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Cancer and the Medical School Curriculum

A special committee comprising representatives of fourteen medical schools and of the National Research Council met recently at the National Cancer Institute, Bethesda, Md., with the National Advisory Cancer Council to discuss the place of cancer in the medical school curriculum.

Dr. Frank E. Adair, chairman of the committee, declared that something must

be done to improve the education of medical students in cancer, which ranks second as a cause of death in the United States. Among the suggestions made were the establishment of professorships in clinical cancer, greater use of the facilities of cancer diagnosis and cancer prevention clinics, the establishment of cancer institutes or hospitals in connection with medical schools in large urban centers, and greater emphasis in the medical school on the importance of preventive medicine.

A committee to outline a plan of teaching and to make recommendations, which will be sent to all medical schools, will be appointed later.

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Occupational Therapy

The Williams & Wilkins Company, publishers, announces that beginning with Volume 26 in February, 1947, Dr. Sidney Licht will assume editorship of "Occupational Therapy and Rehabilitation." Dr. Licht has long been associated with this field of work and during the late war was Chief of Physical Medicine and Rehabilitation at the Army's largest general hospital (Lovell) for over three years.

The editorial policy now enters an entirely new phase. It will be devoted to scientific applications of occupational therapy and to advances in rehabilitation. It will be aimed primarily at physicians, although trained occupational therapy aids will benefit considerably from the information gained from such articles.

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Mary Putnam Jacobi Fellowship

The Women's Medical Association offers a Mary Putnam Jacobi Fellowship for medical research for the year nineteen forty-seven. This fellowship of one thousand dollars ($1,000) available October first, is open to any woman doctor either American or foreign who is a graduate of a reputable medical school. Five hundred dollars is available October first with the second five hundred dollars following at the end of the fourth month. There is also the possibility of a third five hundred dollars being awarded if the committee judges the work to be of special merit.

Application for this fellowship must be filed with the secretary of the committee by March 1, 1947, and will be acted upon by May 1, 1947. Application must be accompanied by (1) a recent report of the applicant's health, (2) transcripts of her college and medical school records, (3) personal letters of recommendation from two or more doctors under whom she has studied, (4) a statement from the person under whom she proposes to study of his interest in her project, (5) a statement by the applicant herself of the problem she proposes to investigate, (6) a recent photograph. All of the above data must be at hand before application is considered.

The recipient of the fellowship will be expected to give her full time to the study of her problem and to make reports to the committee at four month intervals with a view to publication if suitable at the end of her research.

Application blanks may be obtained from the secretary of the committee, Dr. Phebe L. DuBois, 150 East 73rd St., New York 21, N. Y.

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Association of Medical Illustrators

The Association of Medical Illustrators, which was organized in Chicago in July of 1945, held its first annual convention in Philadelphia the week of September 23, 1946. In addition to routine business and reports of all committees, there were discussions on the training of the medical illustrator; requirements for membership in the association; plans for a Max Broedel memorial, to honor the great figure in medical illustrating; and numerous other subjects of immediate interest to the associate members.

The officers of the association are: Mr. Tom Jones, president; Mr. Willard C. Shepard, vice president; Miss Muriel McLatchie, secretary; Miss Elizabeth Broedel, treasurer; Mr. Elon Clark, chairman of the Board of Governors.

The association had the unanimous feeling of real accomplishment, and of a further solidifying of the foundations upon which its plans for the future are building, plans "to promote the study and encourage the advancement of medical illustration and allied fields of visual education; to advance medical education, and to promote understanding and cooperation with the medical and related professions."

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Fellowships for Physicians

Announcement is made by Surgeon General Thomas Parran of the U. S. Public Health Service that applications for Fellowships in postgraduate public health training for physicians for the school year beginning in the fall of 1947 will be received at any time prior to May 1, 1947. The Fellowships are made possible by a grant of $228,400 from the National Foundation for Infantile Paralysis through funds contributed to its March of Dimes. The Fellowships provide an academic year's graduate training of approximately nine months in an accredited school of public health, followed by three months of field training, and are open to men and women, citizens of the United States, under 45 years of age. Applicants must have completed at least a year's internship. The Fellowships are administered by the Committee on Training of Public Health Personnel, which consists of representatives of schools of public health, the State and Territorial Health Officers, the American Public Health Association, and the U. S. Public Health Service.

The specific purpose of the Fellowships is to aid in the recruitment of trained health officers, directors of special services, to help fill hundreds of vacancies existing in State and local health departments throughout the country. The Fellowships are intended for newcomers to the public health field, and are not open to employees of State and local health departments, for whom Federal grant-in-aid funds are already available to the States.

Applicants for Fellowships may secure further details by writing to the Surgeon General, U. S. Public Health Service, 19th and Constitution Avenue, N. W., Washington 25, D. C., attention Public Health Training.

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The Mississippi Scholarship Loan Program

According to the legislation authorizing and establishing this program, an applicant for loan must be *acceptable for enrollment* at a Class A medical school. This Board has placed the responsibility of gaining admission to a medical school upon the student, mainly because of the congested situation with regard to medical school admission at the present time. Students now being considered for February loans, however, may be approved for such loan conditional upon entrance to medical school in February—in other words, the loan can be granted conditionally, *at the midyear only,* for students having difficulty getting into medical school. Although members of the Board realize that an applicant for admission to a medical school is judged by his grades, personality, and general qualifications, and not by the fact that he is an applicant for loan, the legislation specifically states that he need be only "acceptable for enrollment."

The purpose of this program is not primarily to enable applicants to obtain medical education, but is first and foremost to obtain doctors for the *rural* areas of Mississippi, and in so doing to assist students, who wish to serve their state in this way, to meet the costs of their medical education.

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Dr. Fredrick F. Yonkman

Dr. Fredrick F. Yonkman, director of research at Ciba Pharmaceutical Products, Inc., and a member of the faculty of Columbia University College of Physicians and Surgeons, addressed the Medical Association of Puerto Rico during their annual meeting December 11 to 15. His topic was "Antihistaminic Agents: A New Approach to the Treatment of Allergy."

Proposed Merger of Testing Agencies

There are many signs that the testing movement, which was in its infancy during World War I, is coming of age. One of these is the recent report by a special committee of college presidents and other educators to the Carnegie Foundation for the Advancement of Teaching; it recommends the merger of national nonprofit testing agencies, in order to avoid duplication of effort and to provide a higher standard of research and service.

The committee unanimously recommends that the College Entrance Examination Board, the Educational Records Bureau, the Cooperative Test Service and National Committee on Teacher Examinations of the American Council on Education, the Graduate Record Office of the Carnegie Foundation for the Advancement of Teaching, and any other organizations active in the field join in the creation of the Cooperative Educational Testing Commission, to be affiliated with the American Council on Education. The functions of the Commission would include the services now being rendered by these organizations, not only general-examination service at all educational levels for schools, colleges, universities, professional schools, government departments, industry, and professional societies, but also a comprehensive program of research and development in the field of educational measurement.

The report places strong emphasis on research; it provides that 80 per cent of the assets contributed to the Commission by the constituent agencies be earmarked for the support of research to be carried on by the organization and by other agencies. It recommends also that not less than $750,000 be provided by foundation grants, largely for research purposes.

The authors of the report have no desire to set up an organization to monopolize testing in the United States. They point out that there are many regional, state, city, and individual school testing programs, and that an estimated four-fifths of the tests used in this country are sold by commercial publishers. Hence the danger of monopoly is very remote.

The Commission would not attempt to do the whole job of developing and using tests, but it would consider the job as a whole and see that the things most needed were done. "It would carry on research primarily in areas in which effective work is not being done; it would develop tests in areas where new tests are badly needed; it would provide a type of advisory service which has hitherto been unavailable except to limited groups; and finally, it would stimulate and encourage research everywhere and help educators needing greater guidance in the selection, use, and interpretation of tests."

The report is preliminary, merely proposing a general plan; it does not deal with the practical problems involved in putting the plan into practice. It is published "to stimulate the fullest possible discussion of the practical means of arriving at the objective."

That testing has an important part to play in education and other aspects of American life is no longer open to argument. In the years that lie ahead, it will, no doubt, be more important than ever; hence the imperative need for research and service on the highest possible level. This the Committee's plan promises to provide. It is to be hoped that solutions to the practical problems involved in putting it into effect may speedily be found.—(*J. Higher Education*, Dec., 1946, p. 489.)

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Winthrop Chemical Company Supports Research

Grants, totaling $92,500, for special medical-research projects during 1945 and 1946 in universities, hospitals, and foundations have been made by Winthrop Chemical Company, Rensselaer, New York. A fellowship in pharmacology was established at Yale University. Columbia University has received two grants for the study of tropical diseases and enzyme chemistry. At Harvard, two

investigations are concerned with antiseptics and detergents, and mercurial diuretics. The following universities likewise received two grants each: Michigan State College, a grant for investigations in chemistry, and one for the study of plant molds and fungi; New York University, for a study of pyrogens and pharmacologic and clinical investigations of new drugs; Stanford University, fellowship in pharmacology to run through 1946 and 1947; University of Minnesota, for a study of epilepsy and pharmacologic and clinical investigations of new drugs; University of Texas, studies in anesthesis and a study of vitamins and Diodrast; George Washington University, investigations in pharmacology; and Washington University, studies in internal medicine. Vitamin research is being carried on under the grants at the University of Iowa and at Western Reserve University. Industrial grants were accorded to Massachusetts State College. Other colleges on the list are Albany Medical College, a research fellowship; Emory University, studies in nutrition; Rensselaer Polytechnic Institute, a fellowship in chemistry; University of Chicago, John J. Abel Fellowship in Pharmacology; University of Utah, a fellowship in pharmacology; University of Wisconsin, a fellowship in chemistry; and University of Manitoba, a grant made to study problems in sanitation.

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The Eye-Bank for Sight Restoration, Inc.

The Board of Directors announced the following scholarship and fellowship awards and appointments:

Dr. Herbert M. Katzin of New York has been put in charge of the Laboratory for Ophthalmic Research of The Eye-Bank for Sight Restoration, Inc. Dr. Frank Constantine has been granted a Fellowship to pursue studies in relation to corneal vascularization. Dr. Arnold Forest of the Army Institute of Pathology, Washington, D. C., has been granted a Fellowship for training in Ophthalmic Pathology with special emphasis on corneal pathology. Dr. Milo H. Fritz of New York has been granted a Fellowship to continue studies in vitreous replacement and vitreous transplants.

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National Board of Medical Examiners

Dr. Merritts W. Ireland has resigned from the presidency of the Board because of his impaired health. He has been president since 1936. Dr. Borden S. Veeder will serve as acting president until the next meeting of the Board.

Dr. J. Roscoe Miller, dean Northwestern University Medical School, has been elected a member of the Board.

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Handy Slide Rule for Metric Conversion

Ciba Pharmaceutical Products, Inc., Summit, New Jersey, are currently mailing to all physicians an extremely useful promotional piece. Designed to aid the physician in converting apothecary to metric units, the Medical Slyd-Rul is only 5½ inches in length and may be carried in the vest pocket. Due to manufacturer's error in placement of decimal point, conversion from 0.4 grain to gram is incorrect. It should read 0.025 gram, not 0.25. Corrected temporary paper is being mailed to physicians.

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Alpha Epsilon Delta Premedical Conference

Alpha Epsilon Delta, national honorary premedical fraternity, is planning a regional conference on premedical education in cooperation with the University of Louisville February 21-22, 1947. The program will include one session on the basic sciences and another on the social sciences and humanities in relation to premedical and medical education. Each session will be addressed by a prominent educator and will be followed by two hours of open discussion of problems presented by the participants.

Book News

Medical Research: A Symposium

Edited by Austin Smith, M.D., Secretary, Council on Pharmacy and Chemistry, American Medical Association. J. B. Lippincott Company, Philadelphia. 1946. Price, $5.

What is medical research? Who contributes? What does each contributor expect in return? This book is offered to provide the answers to these and similar questions; to supply a background for the understanding of medical research; to explain how research money is used and to expound the needs that exist and the methods by which these needs can be met.

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Hygiene: A Textbook for College Students on Physical and Mental Health from Personal and Public Aspects

By Florence L. Meredith, M.D., Professor of Hygiene and Public Health, Tufts College. Ed. 4. The Blakiston Company, Philadelphia. 1946. Price, $4.

A good text for the college student. The main topics are well chosen and the facts clearly presented.

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Diseases of the Heart

By Sir Thomas Lewis, M.D., Physician in Charge of Clinical Research, University College Hospital, London. Ed. 4. Macmillan and Company, London. 1946. Price, $4.50.

Completely revised, especially the chapters that deal with cardiac failures. Every medical student will do well to provide himself with a copy of this book because many of his patients later will fall into this category of disease.

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Muscle Testing: Techniques of Manual Examination

By Lucille Daniels, M.A., Director and Associate Professor of Physical Therapy, Stanford University; Marian Williams, M.A., Assistant Professor of Physical Therapy, Stanford University, and Catherine Worthingham, M.A., Director of Professional Education, National Foundation for Infantile Paralysis. W. B. Saunders Company, Philadelphia. 1946. Price, $2.50.

The authors give in detail technical information on muscle topography, muscle function, joint range and nerve distribution and by means of drawings and diagrams adapt the information to immediate use. This book meets a definite need and has particular value for medical students.

Illustrations of Anatomy for Nurses

By E. B. Jamieson, M.D., Senior Demonstrator in Anatomy, University of Edinburgh. Ed. 2. Williams & Wilkins Company, Baltimore. 1946. Price, $3.

Even the medical student will find this book useful in his studies in regional anatomy. The illustrations are very clear, well marked.

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Laboratory Manual for Principles and Processes of Pharmacy

Henry M. Burlage, Ph.D., Professor of Pharmacy, School of Pharmacy, University of North Carolina, Editor. McGraw-Hill Book Company, Inc., New York. 1946. Price, $3.

For the pharmacy student.

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An Atlas of the Commoner Skin Diseases

By Henry C. G. Semon, F.R.C.P., Lon. Ed. 3. Williams and Wilkins Company, Baltimore. 1946.

The illustrations alone make this book a real treasure. They should prove extremely helpful in attempting to make a diagnosis.

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Principles of Animal Biology

By A. Franklin Shull, Professor of Zoology, University of Michigan, with the collaboration of George Hull Larue, Professor of Zoology, and Alexander G. Ruthven, President University of Michigan. Ed. 6. McGraw-Hill Book Company, Inc., New York. 1946. Price, $4.

Should be recommended to premedics. The chapter on genetics is especially worth while for that group.

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Introduction to Surgery

By Virginia K. Frantz, M.D., and Harold Dortic Harvey, M.D., Assistant Professors of Surgery, Columbia University. Oxford University Press, New York. 1946. Price, $2.50.

An excellent "refresher." It is compact and concise, just what the medical student needs.

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Clinical Methods of Neuro-Ophthalmologic Examination

By Alfred Kestenbaum, M.D., Assistant Clinical Professor of Ophthalmology, New York University. Grune & Stratton, New York. 1946. Price, $6.75.

Presents what the title indicates.

The Eye Manifestations of Internal Diseases

By I. S. Tassman, M.D., Associate Professor of Ophthalmology, Graduate School of Medicine, University of Pennsylvania. Ed. 2. The C. V. Mosby Company, St. Louis. 1946.

If this well written and well arranged text is not helpful in making a diagnosis, and there is no reason why it should not do that, the many fine illustrations will be helpful. The author has done a very much needed piece of work. Internists should take advantage of it.

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Clinical Hematology

By Maxwell M. Wintrobe, M.D., Ph.D., Professor of Medicine, University of Utah School of Medicine. Ed. 2. Lea & Febiger, Philadelphia. 1946. Price, $11.

Completely revised and many new illustrations added.

Among the new discoveries in hematology reviewed in this edition are the chemical structure and the synthesis of "folic acid" and the demonstration of its effect in pernicious anemia and related disorders, the Rh factor and its role in hemolytic transfusion reactions and in the pathogenesis of hemolytic disease of the newborn, and the effect of nitrogen mustards in Hodgkin's disease and related disorders. This book is clinical and yet devotes much space to basic physiology and biochemistry. It describes the latest methods for the diagnosis and treatment of diseases of the blood. It reflects the newest knowledge produced by research.

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White's General Biology

By E. Grace White, Ph.D., Professor of Biology, Wilson College, Chambersburg, Pa. Ed. 3. The C. V. Mosby Company, St. Louis. 1946.

Premedical students will like this book. It is well written and presents many fine illustrations to elucidate an excellent text.

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Myasthenia Gravis

By Dr. Adelberto Goni, Staff Member of the Hospital Alvear, Buenos Aires. Translated by Georgiana S. Gittinger. The Williams & Wilkins Company, Baltimore. 1946.

Offering in English a book chosen for its worth but originally written in Spanish.

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Victory Over Pain: A History of Anesthesia

By Victor Robinson, M.D. Henry Schuman, New York. 1946. Price, $3.50.